#36964658 88065643
HD 243 .C2 E242 1996 v.1

DRAFT ENVIRONMENTAL IMPACT STATEMENT/
ENVIRONMENTAL IMPACT REPORT

State Clearinghouse No. 95052023

Eagle Mountain Landfill and Recycling Center Project

Technical Appendices Volume I

County of Riverside Planning Department

and

United States Department of the Interior
Bureau of Land Management

Prepared by:
CH2MHILL

July 1996

Appendix A
Public Scoping Documents and Superior Court Statement of Decision

A-1 Scoping Material
A-2 Statement of Decision
A-3 Correspondence
A-4 Legal Description of Site
A-5 Recipients of Draft EIS/EIR

Appendix A-1
Scoping Material

FEDERAL REGISTER NOTICE DESCRIPTION

To: WO Director (140)
State Director, California (CA-930)

From: Area Manager, Palm Springs-South Coast Resource Area Office, California Desert District

---

Title of Document:

Eagle Mountain Landfill Project Environmental Impact Statement/Environmental Impact Report (EIS/EIR)

Statement of Sensitivity:

This project is controversial and will likely be appealed

Description of Notice:

In compliance with 40 CFR 1508.22, this notice informs the public of BLM's intent to prepare a joint EIS/EIR with Riverside County to analyze the impacts of a proposed right-of-way and land exchange with Kaiser Steel Resources Inc. (KSR) and a proposed Class III waste disposal facility at KSR's Eagle Mountain Mine, Riverside County, California. The landfill would be operated by the Mine Reclamation Corporation (MRC).

Date Work was begun on Notice: APR 2 4 1995

Date Notice is to be Published: MAY 1 2 1995

Name of Official Signing Document: Julia Dougan

Title: Area Manager

Telephone Number: (619) 251-4800

Project Lead: Joan Oxendine

Title: Chief-Resources and Planning

Telephone number: (619) 251-4804

Date Forwarded to WO, SD, FR: MAY 15 1995

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Palm Springs — South Coast Resource Area
63-500 Garnet Avenue
Post Office Box 2000
North Palm Springs, CA 92258-2000

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
1795
(CA-066.31)

MAY 05 1995

Director, Office of the Federal Register
National Archives and Records Service
General Services Administration
Washington, D.C. 20408

Dear Sir:

Enclosed are three (3) signed copies of a notice of intent to prepare a joint Environmental Impact Statement/Environmental Impact Report for the Eagle Mountain Landfill Project. A copy of the notice is also provided on diskette and may be accessed using WordPerfect 5.1. Please publish this notice in the *Federal Register* at the first available opportunity.

Thank you for your assistance.

Sincerely,

Julia Dougan

Julia Dougan
Area Manager

Enclosures (3)

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[CA-066-00-5440-10-ZBBB; CACA-30079; CACA-25594; CACA-3192]

Subject: Proposed Land Exchange and Rights-of-Way for Eagle Mountain Non-Hazardous Municipal Solid Waste Landfill and Recycling Center

Agency: Bureau of Land Management, Department of the Interior, Palm Springs-South Coast Resource Area, Desert District, California

Action: Notice of Intent to Prepare an Environmental Impact Statement

Summary: In compliance with the National Environmental Policy Act (NEPA) of 1969 and Title 40 Code of Federal Regulations Part 1508.22, notice is hereby given that the Bureau of Land Management (BLM) and the County of Riverside (County) will prepare a joint Federal Environmental Impact Statement/County Environmental Impact Report (EIS/EIR) for a proposed land exchange and rights-of-way with Kaiser Eagle Mountain, Inc. (Kaiser) for a proposed Class III non-hazardous, municipal solid waste landfill and recycling center at the Eagle Mountain mine site in Riverside County, California. The landfill would be operated by Mine Reclamation Corporation (MRC).

In the proposed land exchange, BLM would acquire from Kaiser approximately 2,846 acres of land that include areas containing important habitat for the desert tortoise (a federally listed threatened species) and habitat supporting the desert pupfish (a federally listed endangered species). The acquisition of these offered private lands would benefit BLM's biological, cultural, scenic, and resource management goals and programs.

BLM would transfer to Kaiser approximately 3,481 acres of public land, much of which is disturbed from past mining operations and is subject to unpatented mining and mill site

claims currently held by Kaiser. Kaiser would lease this land together with other lands necessary for the landfill to MRC for use in developing and operating a Class III non-hazardous, municipal solid waste landfill and recycling center (Landfill).

Kaiser is also applying for the conversion of a legislatively approved railroad right-of-way (granted to Kaiser for rail and road access to the mine site for mining purposes) to a 26.8 mile right-of-way grant pursuant to the Federal Land Policy and Management Act (FLPMA) of 1976 for rail and road access to the site. Kaiser also is applying for a new 6.75 mile right-of-way pursuant to FLPMA to allow road access via existing Eagle Mountain Road to the site. The new FLPMA right-of-way is proposed to be issued jointly to Kaiser and the Metropolitan Water District. The proposed new FLPMA right-of-way to Kaiser would supersede the existing legislative right-of-way to allow use of the rail and road for landfill purposes.

The site also would be used for rail and equipment maintenance, landfill gas recovery and utilization, flare/energy recovery, and leachate processing. Alternatives to the current proposal will be considered in the EIS/EIR.

Supplementary Information: The project site is Kaiser's open iron mine located in the Eagle Mountains in eastern Riverside County, California. The site is located approximately 10 miles north of Interstate Highway 10 and Desert Center, approximately 170 miles east of Los Angeles, and approximately 50 miles west of the Arizona border.

MRC has leased from Kaiser the lands necessary for the Landfill and a 52-mile private railroad for the Landfill for a period of 100 years. MRC proposes to use approximately 4,564 acres of the leased area for the Landfill facility site, of which about 2,262 acres would be for actual landfilling. The proposed railroad right-of-way traverses public land from Ferrum to the mine site. Before refuse is delivered to the project site, it will be processed through a transfer station or a Materials Recovery Facility (MRF) as near as practicable to the sources of refuse production in Southern California. At the transfer station or MRF, which will not be owned or operated by MRC, refuse will be screened for hazardous substances, sorted for recyclables, compacted, and loaded into closed shipping containers. The closed containers

will be transported to the Landfill site by train or in some cases by truck. MRC plans to have the Landfill operational in 1997.

Initially, MRC expects to receive approximately 3,000 to 4,000 tons of waste per day. Over the first 10 years, this daily volume is expected to reach 12,000 tons per day. The peak waste flow of 20,000 tons is not expected to be reached until at least 20 years into the operations, with 18,000 tons per day being transported by rail and a maximum of 2,000 tons per day being transported by road. The waste would be placed in and around the existing open mining pits at the site. The estimated total capacity of the proposed Landfill is approximately 670 million tons.

The project would be developed to meet stringent state and federal regulations and guidelines for municipal solid waste landfills. The entire area underlying the refuse would be lined with a composite liner overlain by a leachate collection and removal system. At no time would refuse be placed upon or against unlined native material. Other environmental monitoring and control systems to be constructed would include: groundwater monitoring wells, leachate collection and treatment system, drainage systems, and landfill gas control and recovery systems.

In conjunction with the development of the Landfill, Kaiser would redevelop the Eagle Mountain Townsite (Townsite) located near the Landfill site. The Townsite consists of residential and commercial buildings and infrastructure as well as an operating community correctional facility. Although the Townsite was once populated with nearly 3,700 people, the current Townsite population has decreased to approximately 220 people.

The Eagle Mountain Landfill and Recycling Center project was previously evaluated in a Joint EIS/EIR prepared by the BLM and the County. A Notice of Intent for the prior EIS/EIR was published November 15, 1989 (See 54 Federal Register 47581). The County certified the EIR portion of the joint document on November 3, 1992, and the BLM issued its Record of Decision (ROD) for the Project on October 20, 1993. Appeals were filed with the Interior Board of Land Appeals (IBLA) as a result of the BLM's approval of the project.

In December, 1992, three lawsuits were filed in state court challenging the adequacy of the EIR under the California Environmental Quality Act (CEQA). In September, 1994, a state court judge issued a Writ of Mandate to the County finding the EIR inadequate in specified areas and requiring further environmental review to be undertaken by the County. As the County was preparing to initiate a new round of environmental review to address the deficiencies identified by the state court in its Writ of Mandate, BLM requested that the ROD be remanded to the BLM to facilitate undertaking joint environmental review with the County pursuant to the National Environmental Policy Act (NEPA). The IBLA has now remanded the matter to the BLM to allow for further environmental review.

BLM has agreed to again prepare a joint NEPA/CEQA environmental document in cooperation with the County. The new document will include review of potential environmental impacts from the anticipated improvements to the Townsite, located adjacent to the Landfill site. The County will concurrently process land use applications for the Landfill and the Townsite.

BLM has responsibility for the environmental review being conducted pursuant to NEPA and will ensure appropriate review in accordance with Council on Environmental Quality (CEQ) regulations for implementing NEPA, pertinent guidance contained in the Department of Interior Manual on Environmental Quality (DM 516), and the BLM NEPA Handbook (H-1790-1). The environmental document will be developed by a third party contractor approved by BLM. BLM will maintain overall responsibility for preparation and review of the document.

Dates: Four public scoping meetings will be held on consecutive days at the following times and locations:

9 a.m - 12 p.m. May 31, 1995: Council Chamber, City of Palm Desert, 73-510 Fred Waring Drive, Palm Desert, California

6 p.m. - 9 p.m. May 31, 1995: County Service Area #51, Clubhouse, 26251 Parkview, Desert Center, California

9 a.m - 12 p.m. June 1, 1995: Riverside Raincross Convention Center, Community Room, 3443 Orange Street, Riverside, California

6 p.m. - 9 p.m. June 1, 1995: Ramada Inn, San Jacinto Room, 3885 West Florida Avenue, Hemet, California

Registration begins at 8:30 a.m. for the morning meetings and 5:30 p.m. for the evening meetings.

Public participation is an integral part of the review process. Comments are being requested to help identify significant issues or concerns related to the proposed action to determine the scope of the issues (including alternatives) that need to be analyzed, and to identify and eliminate from detailed study the issues that are not significant. All comments recommending that the EIS/EIR address specific environmental issues should contain supporting documentation and rationale. Written comments must be submitted no later than 30 days from the date of this notice to the following address: Ms. Julia Dougan, Area Manager, Bureau of Land Management, Palm Springs-South Coast Resource Area Office, 63-500 Garnet Avenue, North Palm Springs, California, 92258-2000.

For Additional Information Contact:

Dr. Joan Oxendine, BLM, Palm Springs-South Coast Resource Area, P.O. Box 2000, North Palm Springs, CA 92258-2000, telephone 619-251-4804

Dated: May 5, 1995

Julia Dougan

Julia Dougan
Area Manager

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Palm Springs — South Coast Resource Area
63-500 Garnet Avenue
Post Office Box 2000
North Palm Springs, CA 92258-2000

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
1795
(CA-066.31)

JUN 15 1995

Director, Office of the Federal Register
National Archives and Records Service
General Services Administration
Washington, D.C. 20408

Dear Sir:

Enclosed are three (3) signed copies of a correction notice for the Eagle Mountain Landfill project notice published in the *Federal Register* on May 11, 1995. A copy of the notice is also provided on diskette and may be accessed using WordPerfect 5.1. Please publish this notice in the *Federal Register* at the first available opportunity.

Thank you for your assistance.

Sincerely,

Julia Dougan

Julia Dougan
Area Manager

Enclosures (3)

4310-40-M
4-00160

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[CA-066-00-5440-10-ZBBB; CACA-30070; CACA-25594; CACA-31926]

Subject: Proposed Land Exchange and Rights-of-Way for Eagle Mountain Non-Hazardous Municipal Solid Waste Landfill and Recycling Center

Correction

In notice document 95-11645, beginning on page 25243, in the issue of Thursday, May 11, 1995, make the following correction:

1. On page 25243, in the third column, third line, "CACA-30079" should read "CACA-30070".

2. On page 25243, in the third column, fourth line, "CACA-3192]" should read "CACA-31926]".

Dated: June 6, 1995

Julia Dougan

Julia Dougan
Area Manager

COUNTY OF RIVERSIDE

TRANSPORTATION AND LAND MANAGEMENT AGENCY

Planning Department

Aleta J. Laurence
Director of Planning

NOTICE OF PREPARATION
FOR AN ENVIRONMENTAL IMPACT REPORT (EIR) FOR THE
EAGLE MOUNTAIN LANDFILL AND RECYCLING CENTER
RIVERSIDE COUNTY, CALIFORNIA

May 6, 1995

TO:

State Clearinghouse and interested agencies, organizations, and members of the public.

LEAD AGENCY:

Riverside County
Planning Department
4080 Lemon Street 9th Floor
Riverside, CA 92502-1409
Contact: David Mares, Senior Planner

CONSULTING FIRM:

CH2M HILL
2510 Red Hill Avenue
Santa Ana, CA 92705
Contact: Tom Peters

4080 Lemon Street, 9th Floor•Riverside, California 92501•(909) 275-3200
P. O. Box 1409•Riverside, California 92502-1409•FAX (909) 275-3157

PUBLIC REVIEW PERIOD:

The Riverside County Planning Department is the lead agency for preparation of an environmental impact report (EIR) for the project identified in this Notice of Preparation (NOP). We are requesting input from you or your agency regarding the scope and content of the environmental information for this project as it pertains to your interests or your agency's statutory responsibilities. **Comments are requested by June 20, 1995.** The project description, location, and potential environmental effects to be addressed in the EIR are contained in the attached materials.

In responding to this NOP, responsible agencies and other agencies having jurisdiction over natural resources that may be affected by the project are requested to provide detailed prescriptive and/or performance standards applicable to project activities that will be subject to review and/or approval of the responding agency. This information will be used to assist in the evaluation of standards of significance and development of mitigation measures to address any significant impacts of the project identified by each agency (see Public Resources Code Section 21081.6).

Please direct your written comments to:

Mr. David Mares, Senior Planner
Riverside County Planning Department
P.O. Box 1409
Riverside, CA 92502-1409

PUBLIC AND AGENCY SCOPING MEETINGS:

Four public scoping meetings will be held to discuss the project and scope of the EIR. The purpose of these meetings is to identify issues that should be addressed in the EIR. The public meetings will be open to all interested members of the public. These scoping meetings will be held at the following locations and times:

9 a.m - noon (Wednesday), May 31, 1995: City Hall, Council Chambers
73-510 Fred Waring Drive, Palm Desert, California

6 p.m. - 9 p.m. (Wednesday), May 31, 1995: Lake Tamarisk Clubhouse
26251 Parkview Drive, Desert Center, California

9 a.m - noon (Thursday), June 1, 1995: Raincross Square Convention Center, Community Room, 3443 Orange Street, Riverside, California

6 p.m. - 9 p.m. (Thursday), June 1, 1995: Ramada Inn, San Jacinto Room, First Floor, 3885 West Florida Avenue, Hemet, California

PROJECT TITLE: Eagle Mountain Landfill and Recycling Center II

PROJECT LOCATION: County of Riverside in the Eagle Mountain area, approximately 10 miles northwest of the community of Desert Center (See Attachment 1).

DESCRIPTION OF THE PROPOSED PROJECT:

Background

Mine Reclamation Corporation (MRC) and Kaiser Eagle Mountain, Inc., (Kaiser) propose to develop the Eagle Mountain Landfill and Recycling Center Project (Project), located at the Kaiser Eagle Mountain mine in eastern Riverside County, approximately 60 miles east of Indio in the Chuckwalla Valley. The Project site is approximately 1.5 miles south of the Joshua Tree National Park boundary near the Pinto Basin.

The Project comprises a Class III non-hazardous municipal solid waste landfill (Landfill) on property leased by Kaiser to MRC, and the resulting redevelopment of the existing adjacent townsite (Townsite) proposed by Kaiser. The Project also requires the approval of a land exchange and rights-of-way between Kaiser and the Bureau of Land Management (BLM). The potential environmental impacts of the Landfill and the improvements to the Townsite will be evaluated in an EIR in compliance with the requirements of the California Environmental Quality Act (CEQA), with the County as lead agency under CEQA.

Landfill

The Landfill, which is primarily a waste-by-rail system, will have the capacity to receive up to 20,000 tons of waste a day. It is designed to meet or exceed all applicable federal and state regulations for design and operation of municipal solid waste landfills. The Landfill footprint will cover about 2,262 acres, and buffer and ancillary facilities will occupy another 2,392 acres. Waste for disposal will be non-hazardous municipal solid waste (i.e., regulated as Class III waste under California landfill regulations). All waste accepted at the Landfill will be from Southern California counties (i.e., San Diego, Riverside, Los Angeles, San Bernardino, Ventura, Orange, and Santa Barbara) that comply with the mandatory waste reduction and diversion requirements of the California Integrated Waste Management Act of 1989 (AB 939). No waste will be landfilled from out-of-state sources.

Design. The Landfill design incorporates a state-of-the-art composite liner system to accommodate any leachate that may be generated. The liner system includes a leachate collection and removal system. The Landfill is designed so that the leachate collection system directs flow across the top of the liner towards the leachate collection sumps located at the low points of each subphase. There will be approximately 12 sumps constructed at the low points for collection of the leachate. If any leachate is generated, it

would be removed through pumps installed through leachate collection riser pipes extending to the surface of the fill. Underlying this liner is an Unsaturated Zone Liquids Monitoring System (UZLMS). The UZLMS, which is a secondary system designed to detect and collect any liquids that might migrate from the waste through the liner system, consists of a collection zone, an 80-mil HDPE geosynthetic liner, and geosynthetic-clay liner. All liner systems are constructed on excavated bedrock or soil, or prepared soil fill. The natural materials used for construction are available on-site. The Landfill is designed to manage landfill gas that could be generated as waste decomposes. The gas will be collected by a series of horizontal pipes and vertical wells constructed into the waste.

Operations. The Landfill will be divided into five primary phases. Construction and operation will progress from west to east, and the site will be closed sequentially, in 15- to 50- acre subphases, as the Landfill reaches design grade. Build out of the Landfill is estimated to occur in 100 years. The Landfill facility will operate seven days per week, 24 hours per day. Although landfilling will primarily occur during daylight hours, six days per week, waste may be transported to the facility 24 hours per day.

Transport to Landfill. The waste will be transported to the Landfill site by trucks and by rail. Waste will be in enclosed containers to prevent liquids from leaking and trash from blowing out of the containers. A limit of 100 transfer truck round trips and up to six train trips per day will be accepted at the site. Transfer trucks from outside the desert areas of Riverside County will cease after 3 years.

All incoming waste will first be screened to remove recyclable and potentially hazardous materials at a materials recovery facility (MRF) or transfer station (TS). There are no MRFs or TSs proposed as part of this Project. The site will receive wastes from existing MRFs and TSs, as well as from new MRFs and TSs to be built and operated by other entities. Local area waste will be delivered to the Landfill's Local Waste Receiving Facility (LWRF) by garbage trucks or private trucks and cars. MRF or TS processing will entail inspection, screening and removal of recyclables and unacceptable waste. After sorting and screening, waste will be loaded into transfer trailers or shipping containers by top loading or in some cases by end loading. All shipping containers and transfer trailers will be totally enclosed or covered prior to shipping to the Landfill.

Local area waste and waste from Blythe will be unloaded, inspected and, where appropriate, recyclables or non-compliant waste will be removed. Nonconforming waste will be removed from the Landfill site in the container in which it was transported. The waste will then be transported to the Landfill working face for disposal. Recyclables will be temporarily stored at the site prior to shipment by truck or train to facilities handling large volumes of recyclables.

Waste Inspection During Operations. During waste dumping and compaction, the waste will be inspected for the presence of nonconforming material, and if any is discovered, the operation will be stopped and the questionable waste further inspected and, if necessary, removed. After the waste is compacted, daily cover will be spread on the waste to control blowing litter, rainfall infiltration, or potential vectors. At the end of each work day, all exposed waste will be covered with a six-inch layer of compacted soil. Intermediate cover layers of soil compacted to a minimum thickness of 12 inches will be applied to areas that are inactive more than 180 days.

During the course of operations the leachate collection and removal and the active gas collection systems will collect any liquids migrating through the waste or collect landfill gas as waste decomposes. The liquids will be treated either at the Townsite waste water treatment plant after pretreatment, or at an offsite publicly operated treatment plant. Gas will be collected by a series of vertical gas collection wells installed into the waste as filling progresses. The wells will be connected to a series of gas collection pipes constructed on top of the intermediate fill or under the final cover.

Staffing. The facility will employ about 67 people at initial operations and about 250 people at full operation. Site managerial staff will be responsible for staff supervision, efficient operation and compliance with all permit requirements and regulatory permitting. Staff will be trained specifically for the following functions: weighing, screening and inspecting incoming waste; directing the operations; maintaining and repairing equipment; operating the Landfill gas collection and removal equipment; documenting the operation; monitoring the environmental monitoring equipment; constructing the liner system; and applying daily cover to the waste.

Monitoring. Landfill operations will be continuously monitored by MRC personnel or technical consultants as well as periodically monitored by local and state regulatory personnel. Environmental monitoring at the Landfill comprises primarily six engineered systems: (1) unsaturated zone liquid monitoring system (UZLMS), discussed above; (2) unsaturated zone gas monitoring system (UZGMS) that can detect very small quantities of landfill gas that may migrate through the liner system; (3) a ground water monitoring system around the perimeter of the Landfill; (4) air monitoring (i.e., integrated surface, instantaneous surface, and ambient air sampling, ambient air monitoring); (5) perimeter gas monitoring; and (6) surface water monitoring.

Closure. The closure system is designed to reduce liquids infiltrating the waste; control odor, vectors and litter; prevent erosion and divert rain water to the onsite drainage ways; and control and maintain gas. The cap consists of a foundation layer of 2 feet of compacted soil, a low-permeability barrier layer of polyethylene (10^{-6}), a 1-foot thick layer of protective granular soil on top of a cushion geotextile, an erosion layer constructed with cobbles and boulders, and a final layer designed to blend in to the existing desert landscape.

Townsite

The Eagle Mountain Townsite is an existing, but underutilized, former mining community that supplied housing for Kaiser employees during the active period of mining at the site. It consists of a network of residential and commercial buildings and infrastructure, as well as an operating community correctional facility operated by the Management and Training Corporation, Inc. (MTC). A public use permit has also been granted to MTC for an additional correctional facility within the Townsite area. At the height of active mining operations, the Townsite was populated with as many as 3,700 people. The current Townsite population has decreased to approximately 220 people (excluding the approximately 420 inmates at the correctional facility).

The Townsite contains a total existing single-family housing stock of 347 detached units, 14 other partially constructed residential structures, and 49 residential foundations/slabs. Of this total housing stock, approximately 146 units are currently occupied by or reserved for employees of MTC or Kaiser. The existing developed (but underutilized) area comprises approximately half of the Townsite area. The remaining undeveloped area within the Townsite will be designated as open space or a similar designation under the Townsite Specific Plan. With minor renovations, the existing available housing and infrastructure within the Townsite will be available to accommodate the housing and service needs of Landfill employees and their families. The Townsite is served by a fully improved system of private interior streets; a water storage and distribution system for domestic, industrial and fire protection purposes (drinking water is provided by regular delivery to roof mounted storage tanks); wastewater collection and treatment system; electric and telephone service; and a fire station.

The proposed Townsite Specific Plan and associated General Plan Amendment, Change of Zone and Subdivision will provide for the improvement of the existing developed area of the Townsite resulting from development of the Landfill. The Townsite Specific Plan will acknowledge the existing residential and circulation patterns and will provide planning standards consistent with the substantial infrastructure already located within the Townsite area. The Specific Plan for the Townsite will provide for improvements to the currently unoccupied housing stock similar to the improvements made by Kaiser to the existing occupied homes. Where possible, vacant pads and foundations scattered within the Townsite will be infilled with equivalent housing. Planning standards will reflect and conform to existing development. The Specific Plan will acknowledge that Kaiser maintains ownership of the Townsite and is responsible for many public improvements, maintenance, and service.

PRELIMINARY IDENTIFICATION OF ENVIRONMENTAL ISSUES:

The following environmental issues will be analyzed in the EIR with regard to construction and operation of the Landfill, access roads, rail lines, and expansion of the Eagle Mountain Townsite: water quality and use; public health and safety; traffic and transportation; air

quality; general plan, open space, and land use; surface drainage/flooding; biology; growth inducement and socioeconomics; geology, seismic, and mineral resources; visual, recreation and wilderness resources; utilities and services; noise; cultural resources; paleontology; energy consumption/generation; and cumulative effects of related projects.

The original EIR for this project (State Clearinghouse No. 8908413) was certified by the Riverside County Board of Supervisors in 1992, but was subsequently challenged in San Diego Superior Court (Court). In its Statement of Decision, the Court directed that a new EIR be prepared to address several issues.

In compliance with the Court's decision of July, 1994, the new EIR will also fully analyze the following specific issues identified by the Court:

- the potential cumulative impacts of the Eagle Crest Energy Company's (ECEC's) proposed hydroelectric project
- the environmental impacts of the proposed project in conjunction with the environmental impacts resulting from development to the Eagle Mountain Townsite
- the potential impacts to the desert tortoise and the ability of mitigation measures to protect the tortoise
- the potential impacts to the resources and wilderness experience of the newly designated Joshua Tree National Park
- the factual and scientific basis for the EIR's conclusions that the Landfill liner system can withstand seismic shaking, and the factual and scientific basis for the conclusion that the Landfill liner system can capture and control leachate; also, to provide an explanation regarding the existence or absence of any Holocene faults in the vicinity of Landfill site and the opportunity for additional public comment on Holocene fault studies for the site
- the impact of the Bureau of Land Management's (BLM) existing Level 1 Contaminant Survey and other existing information to identify the presence or absence of hazardous waste at the site
- the feasibility of the mitigation measures for the proposed project in consideration of the ECEC's proposed hydroelectric project, the proposed land exchange between Kaiser and the BLM, and the possibility that the proposed land exchange between Kaiser and BLM might not occur.

- the County's previous participation in litigation (which has since been terminated) involving the hydroelectric project

PERMITS AND APPROVALS:

The project will require local land use approvals from Riverside County before it can proceed. The County serves as lead agency, and the Riverside County Board of Supervisors will consider certification of the EIR and approvals for the Landfill Specific Plan, General Plan Amendment, a Revised Permit to a Reclamation Plan, and Development Agreement with the Applicant, Mine Reclamation Corporation. Seventeen of twenty permits were obtained previously for the project. Many of these permits are still valid, but will need to be reevaluated in light of the current environmental review process. The County will also consider approval of the Townsite Specific Plan, a Zone Change, General Plan Amendment, and Subdivision submitted by Kaiser.

In addition to local land use and EIR approvals, the project also requires the approval of a land exchange between Kaiser (which owns and leases the land to MRC) and the Federal BLM. The County and BLM, acting as co-lead agencies under CEQA and NEPA respectively, previously prepared a joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the project. The BLM issued its Record of Decision (ROD) approving the land exchange and rights-of-way October 20, 1993. The BLM's approval of the land exchange and the rights-of-way grants was appealed by certain opponents of the Landfill to the Interior Board of Land Appeals (IBLA) in the U.S. Department of the Interior. The BLM, however, requested the IBLA to remand the matter to the BLM so that BLM can join the County in its additional environmental review. MRC and Kaiser supported this request. The request was granted and the remand has occurred. This will allow the BLM to be the lead federal agency for preparing a new EIS.

ALTERNATIVES TO THE PROPOSED PROJECT:

Alternatives to the proposed project that will be addressed in the EIR include, without limitation: (1) The No Project Alternative; (2) Reduced Landfill Operations Alternative; (3) Proposed Action with Rail Access Only Alternative; (4) Alternative Access Roads Alternative; (5) a 100% Waste Diversion Alternative; and (6) Alternative Sites.

No Project Alternative

The No Project Alternative would leave the Eagle Mountain site in its present condition, and no landfill would be developed. The caretaker status of the former mining operations would be maintained, at least temporarily. The existing mining reclamation plan (Kaiser Steel Corporation, 1978) would be implemented. The East Pit and surrounding piles of overburden rock and mine tailing would remain, with minor drainage and other improvements to stabilize their surfaces and allow revegetation to occur. Metropolitan communities in Southern California would continue to rely on existing, expanded, or other new landfills. The resulting improvements to the Townsite as a result of landfill development and operation will not occur.

Reduced Landfill Operations Alternative

This alternative would allow for the disposal of up to 16,000 tons per day of waste. Of that total, up to 14,000 tons per day could be delivered by rail and up to 2,000 tons per day could be delivered by truck.

The landfill operating conditions would be similar to the proposed project. Waste would be initially received at transfer stations and MRFs in the seven county area. After sorting, the waste would be shipped via rail or truck to the landfill site. The liner system, leachate collection system, monitoring system, and cap closure would be similar to the proposed project.

Proposed Action with Rail Access Only Alternative

This alternative would eliminate the use of all non-Chuckwalla Valley refuse-hauling trucks to the proposed site resulting in a reduction in the capacity of the landfill to 18,000 tons per day. All other landfill activities of the proposed project would remain the same. This alternative would preclude transporting waste from nearby sources in Blythe and the Coachella Valley.

Access Road Alternative

Under this alternative, transfer trucks would use the existing Kaiser Road to bring waste to the site instead of existing Eagle Mountain Road and its proposed extension. The existing Kaiser Road is located approximately three miles east of Eagle Mountain Road, and extends 10 miles to the landfill site from Interstate 10. Use of Kaiser Road instead of Eagle Mountain Road is not as direct a route to the landfill, and thus would result in approximately 7.5 extra traffic miles round trip per truck load. Kaiser Road is, however, proposed for truck traffic in consideration of the desert tortoise populations identified in the vicinity of Eagle Mountain Road. All other landfill activities of the proposed project would remain the same.

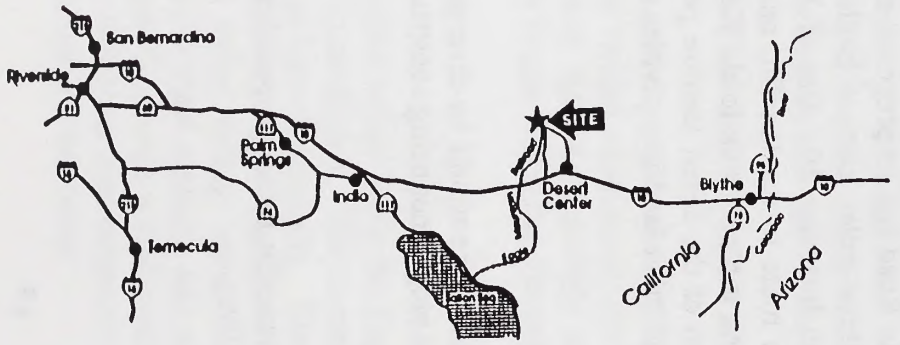
100% Waste Diversion Alternative

This alternative assumes that 100% of the waste would be diverted through recycling or other means. This would also result in the project not being constructed.

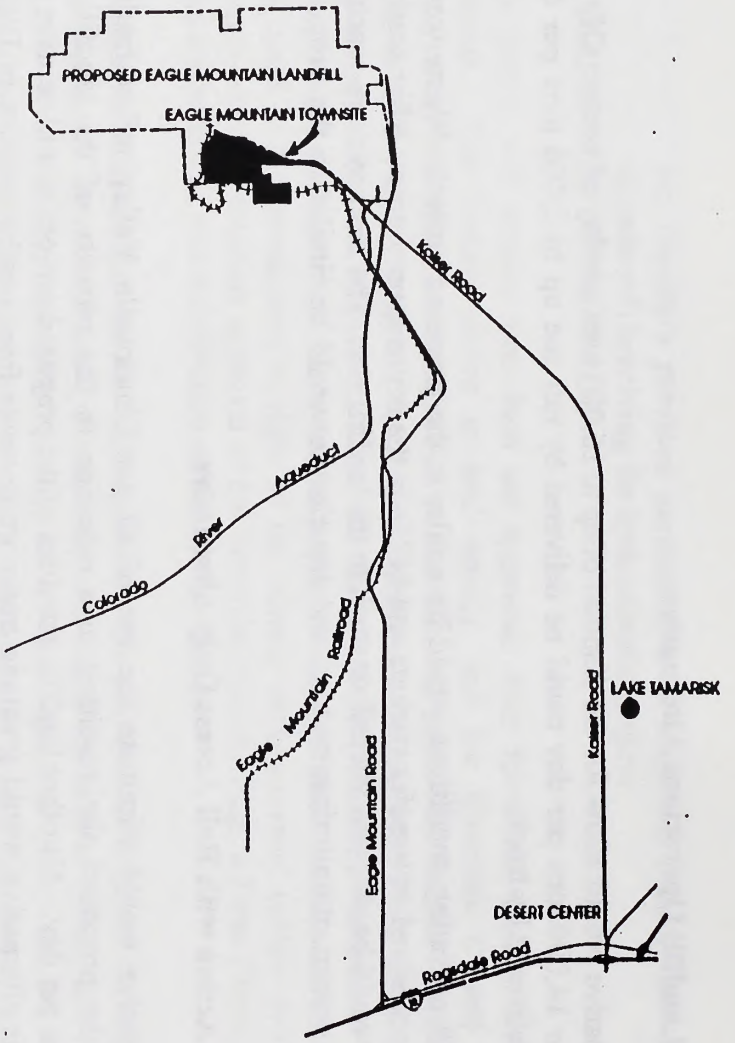
Alternative Sites

Alternative regional landfills that are presently being proposed and developed will be analyzed both cumulatively and individually.

Regional Location Map



Local Vicinity Map



DRAWING TITLE:

Site Location

SOURCE: SMITH PERONI & FOX

Kaiser Eagle Mnt., Inc.

FIGURE NO.

EAGLE MOUNTAIN TOWNSITE

NOT TO SCALE

N

Smith, Peroni & Fox

ATTACHMENT

Eagle Mountain EIS/EIR Scoping Meetings
Dates and Locales

May 31, 1995: 9 a.m. - noon
City Hall, Council Chambers
Palm Desert, California 92260-2578
619-346-0611

May 31, 1995, 6 p.m.-9 p.m.
Lake Tamarisk Clubhouse (County Service area #51)
Desert Center, California 92239
619-227-3203

June 1, 1995: 9 a.m. - noon
Riverside Raincross Convention Center
Riverside, California 92501
909-787-7950

June 1, 1995: 6 p.m. - 9 p.m.
Ramada Inn, 3885 West Florida Avenue
Hemet, California

Eagle Mountain Landfill and Recycling Center

Environmental Impact Statement • Environmental Impact Report

Issuance of Notice of Intent and Notice of Preparation

Announcement of Public Scoping Meetings

The Bureau of Land Management (BLM) and the County of Riverside are preparing an Environmental Impact Statement/Environmental Impact Report (EIS/EIR) in accordance with the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA), using the BLM regulations to implement NEPA and the Riverside County rules to implement CEQA. The purpose of the EIS/EIR is to evaluate the environmental effects of the proposed Eagle Mountain Landfill and Recycling Center to be located approximately 10 miles north of Desert Center and approximately 60 miles east of Indio, California.

NOI/NOP Availability

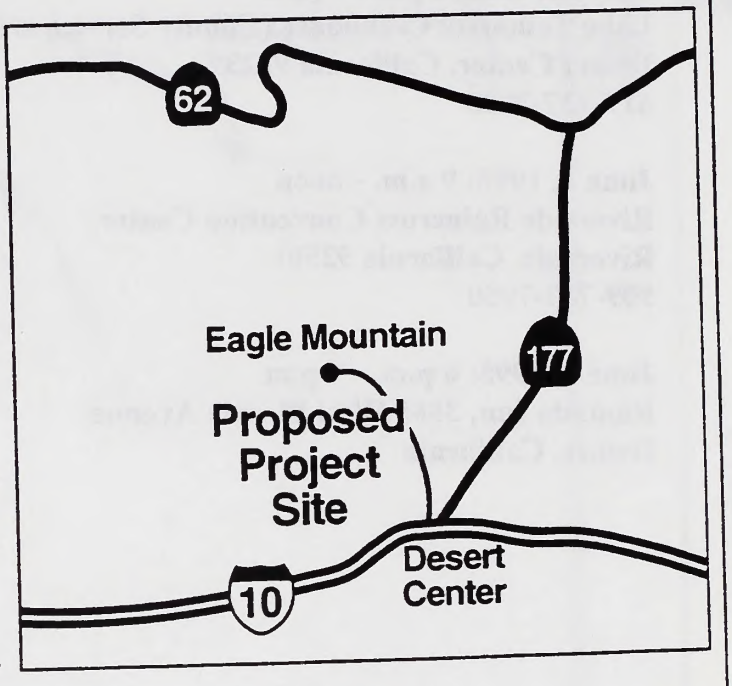
The Notice of Intent (NOI) and the Notice of Preparation (NOP) have been issued by the BLM and the County, respectively, to solicit public participation and to identify pertinent issues to be addressed in the draft EIS/EIR. Copies are available for review at the following locations:

Bureau of Land Management, Palm Springs-South Coast Resource Area:
63-500 Garnet Avenue, North Palm Springs, CA

Riverside County Planning Department Offices:

Riverside Office: Riverside County Administrative Center, 4080 Lemon Street, 9th Floor, Riverside, CA

Bermuda Dunes Office: 7933 Country Club Drive, Suite E, Bermuda Dunes, CA



Libraries:

Desert Hot Springs Public Library
Los Angeles Public Library
Palo Verde Valley District Library
San Bernardino County Library
(Joshua Tree and Yucca Valley Branches)
Indio Branch Library
Palm Desert Public Library
Riverside Central Library
University of California Riverside, Library
Lake Tamarisk Branch Public Library
Palm Springs Library Center
San Bernardino Public Library

Meeting Times, Dates, and Locations

The BLM and Riverside County are holding four public scoping meetings:

9 am-noon (Wednesday) May 31, 1995: City Hall, Council Chamber, 73-510 Fred Waring Drive, Palm Desert, CA
6 pm-9 pm (Wednesday) May 31, 1995: Lake Tamarisk Clubhouse, 26251 Parkview, Desert Center, CA
9 am-noon (Thursday) June 1, 1995: Raincross Square Convention Ctr., Community Room, 3443 Orange St., Riverside, CA
6 pm-9 pm (Thursday) June 1, 1995: Ramada Inn, San Jacinto Room, First Floor, 3885 West Florida Avenue, Hemet, CA

The meeting rooms will be open at 8:30 a.m. for the morning meetings and 5:30 p.m. for the evening meetings. The purpose of the scoping meetings is to provide the public with an opportunity to participate in the identification of alternatives to the proposed project as well as environmental issues that should be analyzed in the EIS/EIR.

Public involvement in the scoping process is encouraged. Written comments may be submitted by June 20, 1995 to:

Dr. Joan Oxendine
U.S. Department of the Interior
Bureau of Land Management
63-500 Garnet Avenue
P.O. Box 2000
North Palm Springs, CA 92258-2000

-or-

Mr. David Mares
Riverside County Planning Department
4080 Lemon Street, 9th Floor
P.O. Box 1409
Riverside, CA 92502-1409

Bureau of Land Management
County of Riverside

SCOPING MEETING

EAGLE MOUNTAIN LANDFILL

AND RECYCLING CENTER

May 31, 1995
9 a.m.-noon
City Hall, Council Chamber
73-510 Fred Waring Drive
Palm Desert, California

AGENDA

8:30 a.m.	Registration	
9:00 a.m.	Welcome and Opening Remarks	Joan Oxendine/BLM
		Dave Mares/County of Riverside
	Agency Roles and Responsibilities	Joan Oxendine/BLM
		Dave Mares/County of Riverside
	Purpose of Scoping Meeting	Tom Peters/CH2M HILL
	Proposed Project	Tom Peters/CH2M HILL
9:30 a.m.	Public Comments	Tom Peters/CH2M HILL
noon	Closing Remarks	Tom Peters/CH2M HILL

Bureau of Land Management
County of Riverside

SCOPING MEETING
EAGLE MOUNTAIN LANDFILL
AND RECYCLING CENTER

May 31, 1995
6 p.m.-9 p.m.
Lake Tamarisk Clubhouse
26251 Parkview
Desert Center, California

AGENDA

5:30 p.m.	Registration	
6:00 p.m.	Welcome and Opening Remarks	Joan Oxendine/BLM
		Dave Mares/County of Riverside
	Agency Roles and Responsibilities	Joan Oxendine/BLM
		Dave Mares/County of Riverside
	Purpose of Scoping Meeting	Tom Peters/CH2M HILL
	Proposed Project	Tom Peters/CH2M HILL
6:30 p.m.	Public Comments	Tom Peters/CH2M HILL
9:00 p.m.	Closing Remarks	Tom Peters/CH2M HILL

Bureau of Land Management

County of Riverside

SCOPING MEETING

EAGLE MOUNTAIN LANDFILL

AND RECYCLING CENTER

June 1, 1995
9 a.m.-noon
Raincross Square Convention Center, Community Room
3443 Orange Street
Riverside, California

AGENDA

8:30 a.m.	Registration	
9:00 a.m.	Welcome and Opening Remarks	Joan Oxendine/BLM
		Dave Mares/County of Riverside
	Agency Roles and Responsibilities	Joan Oxendine/BLM
		Dave Mares/County of Riverside
	Purpose of Scoping Meeting	Tom Peters/CH2M HILL
	Proposed Project	Tom Peters/CH2M HILL
9:30 a.m.	Public Comments	Tom Peters/CH2M HILL
noon	Closing Remarks	Tom Peters/CH2M HILL

Bureau of Land Management

County of Riverside

SCOPING MEETING

EAGLE MOUNTAIN LANDFILL

AND RECYCLING CENTER

June 1, 1995
6 p.m.-9 p.m.
Ramada Inn, San Jacinto Room, First Floor
3885 West Florida Avenue
Hemet, California

AGENDA

5:30 p.m.	Registration	
6:00 p.m.	Welcome and Opening Remarks	Joan Oxendine/BLM Dave Mares/County of Riverside
	Agency Roles and Responsibilities	Joan Oxendine/BLM Dave Mares/County of Riverside
	Purpose of Scoping Meeting	Tom Peters/CH2M HILL
	Proposed Project	Tom Peters/CH2M HILL
6:30 p.m.	Public Comments	Tom Peters/CH2M HILL
9:00 p.m.	Closing Remarks	Tom Peters/CH2M HILL

Bureau of Land Management/County of Riverside

Eagle Mountain Landfill and Recycling Center
Environmental Impact Statement
Environmental Impact Report

Public Scoping Meeting
City Hall, Council Chambers
Palm Desert, California
May 31, 1995: 9 a.m. - noon

Public participation is an important part of the preparation of an environmental impact statement/environmental impact report (EIS/EIR). If you have comments, you are encouraged to speak at the scoping meeting or to send your comments to either Joan Oxendine or David Mares, at the addresses below. Although public involvement is encouraged throughout the EIS/EIR process, it is most helpful to the EIS/EIR scoping effort if your comments are received no later than June 20, 1995. Providing input at this time will ensure that your concerns are considered in preparation of the EIS/EIR.

Comments:

_____

_____

_____

_____

_____

_____

_____

_____

Name: _____

Address: _____

Affiliation: _____ Telephone: _____
(*if any*)

Send comments to either of the following:

Dr. Joan Oxendine, Bureau of Land Management
Palm Springs-South Coast Resource Area, P.O. Box 2000, 63-500 Garnet Avenue
North Palm Springs, CA 92258-2000

Mr. David Mares, Riverside County Planning Department
4080 Lemon Street, 9th Floor, P.O. Box 1409, Riverside, CA 92502-1409

Bureau of Land Management/County of Riverside

Eagle Mountain Landfill and Recycling Center
Environmental Impact Statement
Environmental Impact Report

Public Scoping Meeting
Lake Tamarisk Clubhouse, Desert Center, California
May 31, 1995, 6 p.m.-9 p.m.

Public participation is an important part of the preparation of an environmental impact statement/environmental impact report (EIS/EIR). If you have comments, you are encouraged to speak at the scoping meeting or to send your comments to either Joan Oxendine or David Mares, at the addresses below. Although public involvement is encouraged throughout the EIS/EIR process, it is most helpful to the EIS/EIR scoping effort if your comments and suggestions are received no later than June 20, 1995. Providing input at this time will ensure that your concerns are considered in preparation of the EIS/EIR.

Comments:

_____

_____

_____

_____

_____

_____

_____

_____

Name: _____

Address: _____

Affiliation: _____ Telephone: _____
(*if any*)

Send comments to either of the following:

Dr. Joan Oxendine, Bureau of Land Management
Palm Springs-South Coast Resource Area, P.O. Box 2000, 63-500 Garnet Avenue
North Palm Springs, CA 92258-2000

Mr. David Mares, Riverside County Planning Department
4080 Lemon Street, 9th Floor, P.O. Box 1409, Riverside, CA 92502-1409

Bureau of Land Management/County of Riverside

Eagle Mountain Landfill and Recycling Center
Environmental Impact Statement
Environmental Impact Report

Public Scoping Meeting
Riverside Raincross Convention Center
Riverside, California
June 1, 1995: 9 a.m. - noon

Public participation is an important part of the preparation of an environmental impact statement/environmental impact report (EIS/EIR). If you have comments, you are encouraged to speak at the scoping meeting or to send your comments to either Joan Oxendine or David Mares, at the addresses below. Although public involvement is encouraged throughout the EIS/EIR process, it is most helpful to the EIS/EIR scoping effort if your comments and suggestions are received no later than June 20, 1995. Providing input at this time will ensure that your concerns are considered in preparation of the EIS/EIR.

Comments:

_____

_____

_____

_____

_____

_____

_____

_____

Name: _____

Address: _____

Affiliation: _____ Telephone: _____
(*if any*)

Send comments to either of the following:

Dr. Joan Oxendine, Bureau of Land Management
Palm Springs-South Coast Resource Area, P.O. Box 2000, 63-500 Garnet Avenue
North Palm Springs, CA 92258-2000

Mr. David Mares, Riverside County Planning Department
4080 Lemon Street, 9th Floor, P.O. Box 1409, Riverside, CA 92502-1409

Bureau of Land Management/County of Riverside

Eagle Mountain Landfill and Recycling Center
Environmental Impact Statement
Environmental Impact Report

Public Scoping Meeting
Ramada Inn, 3885 West Florida Avenue
Hemet, California
June 1, 1995: 6 p.m. - 9 p.m.

Public participation is an important part of the preparation of an environmental impact statement/environmental impact report (EIS/EIR). If you have comments, you are encouraged to speak at the scoping meeting or to send your comments to Joan Oxendine or David Mares, at the addresses below. Although public involvement is encouraged throughout the EIS/EIR process, it is most helpful to the EIS/EIR scoping effort if your comments and suggestions are received no later than June 20, 1995. Providing input at this time will ensure that your concerns are considered in preparation of the EIS/EIR.

Comments:

_____

_____

_____

_____

_____

_____

_____

Name: _____

Address: _____

Affiliation: _____ Telephone: _____
(*if any*)

Send comments to either of the following:

Dr. Joan Oxendine, Bureau of Land Management
Palm Springs-South Coast Resource Area, P.O. Box 2000, 63-500 Garnet Avenue
North Palm Springs, CA 92258-2000

Mr. David Mares, Riverside County Planning Department
4080 Lemon Street, 9th Floor, P.O. Box 1409, Riverside, CA 92502-1409

Bureau of Land Management
County of Riverside
Eagle Mountain Landfill and Recycling Center
Environmental Impact Statement
Environmental Impact Report

WHAT IS SCOPING?

"Scoping" is a key element in writing an environmental impact statement/environmental impact report (EIS/EIR). Under the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA), an environmental impact analysis is prepared to determine the potential environmental impacts associated with a proposed project. In this case, the proposed project is Eagle Mountain Landfill and Recycling Center to be located approximately 10 miles north of Desert Center and approximately 60 miles east of Indio, California. Scoping is the early and open process for:

- Inviting participation of affected governmental agencies and other interested persons
- Determining the scope and the significant issues to be analyzed in depth in the EIS/EIR
- Identifying and eliminating from detailed analysis in the EIS/EIR issues that are not significant or have been covered by previous environmental review
- Identifying other environmental review and consultation requirements so that required analyses and studies are prepared concurrently with and integrated into the EIS/EIR
- Indicating the relationship between the timing of the preparation of the EIS/EIR and the Bureau of Land Management's (BLM's) and Riverside County's tentative planning and decision-making schedule

We welcome your active participation and input at this scoping meeting so that we will be better able to identify your concerns about the proposed Eagle Mountain Landfill and Recycling Center, and the reasonable alternatives to the project. It is important you make your views known during the scoping process (either at one of the scoping meetings or in writing by June 20, 1995, the end of the comment period) to ensure that the BLM and the County address all of the appropriate environmental issues and concerns.

Public comments and concerns are incorporated throughout the EIS/EIR process. When selecting the final decision on the proposed project, BLM and Riverside County must consider all relevant NEPA/CEQA documents, public and agency comments on those documents, and the responses to those comments. Those comments and responses become part of the final EIS/EIR.

EAGLE MOUNTAIN LANDFILL AND RECYCLING CENTER SUMMARY OF SUPERIOR COURT DECISION ON THE ENVIRONMENTAL IMPACT REPORT

In compliance with the Court's decision of July, 1994, the new EIR will also fully analyze the following specific issues identified by the Court:

1. **Cumulative Effects:** The potential cumulative impacts of the Eagle Crest Energy Company's (ECEC's) proposed hydroelectric project, including the feasibility of the mitigation measures for the Landfill Project in consideration of the ECEC's proposed hydroelectric project; The County of Riverside's previous participation in litigation (which has since been terminated) involving the hydroelectric project; the proposed land exchange between Kaiser and the BLM, and the possibility that the proposed land exchange between Kaiser and BLM might not occur

2. **Eagle Mountain Townsite:** The environmental impacts of the proposed project in conjunction with the environmental impacts resulting from repopulating the Eagle Mountain Townsite

3. **Desert Tortoise:** The potential impacts to the desert tortoise and the ability of mitigation measures to protect the tortoise

4. **Seismic Activity:** The factual and scientific basis for the EIR's conclusions that the Landfill liner system can withstand seismic shaking and that the Landfill liner system can capture and control leachate; discussion of the existence or absence of any Holocene faults in the vicinity of Landfill site and the opportunity for additional public comment on Holocene fault studies for the site

5. **Joshua Tree National (Monument) Park:** The potential impacts to the resources and wilderness experience of the newly designated Joshua Tree National Park

6. **Potential Presence of Hazardous Materials:** The impact of the Bureau of Land Management's existing Level I Contaminant Survey and other existing information to identify the presence or absence of hazardous waste at the site

Lname	Name	Name2	Name3	Street	Citystzip
	Hon. Alfred E. Alquist (D-13)	California State Senate		100 Paseo de San Antonio	San Jose, CA 95113
	Hon. Antonio Villaraigosa (D-45)	CA State Assembly		110 North Avenue 56	Los Angeles, CA 90042
	Hon. Barbara Alby (R-5)	CA State Assembly		4811 Chippendale Dr., Ste.304B	Sacramento, CA 95841
	Hon. Barbara Friedman (D-40)	CA State Assembly		13701 Riverside Dr., #600	Sherman Oaks, CA 91423
	Hon. Barbara Lee (D-16)	CA State Assembly		1440 Broadway, Ste. 810	Oakland, CA 94612
	Hon. Bernie Richter (R-3)	CA State Assembly		2545 Zanella Way, Ste. D	Chico, CA 95928
	Hon. Bill Hoge (R-44)	CA State Assembly		1276 E. Colorado Blvd.Ste. 203	Pasadena, CA 91106
	Hon. Bill Leonard (R-31)	California State Senate		400 N. Mountain Ave.,Suite 109	Upland, CA 91786
	Hon. Bill Lockyer (D-10)	California State Senate		22634 Second St., Suite 104	Hayward, CA 94541
	Hon. Bill Morrow (R-73)	CA State Assembly		27126A Paseo Espada,#1625	San Juan Capistrano, CA 9267
	Hon. Brett Granlund (R-65)	CA State Assembly		13027 Perris Blvd., Ste. 106	Moreno Valley, CA 92553
	Hon. Brian Setencich (D-30)	CA State Assembly		1111 Fulton Mall, Ste. 914	Fresno, CA 93721
	Hon. Brooks Firestone (D-35)	CA State Assembly		89 S. California St., Ste. E	Ventura, CA 93001
	Hon. Bruce McPherson (27)	CA State Assembly			
	Hon. Bruce Thompson (R-66)	CA State Assembly		29377 Rancho California Rd.	Temecula, CA 92591
	Hon. Byron Sher (D-21)	CA State Assembly		785 Castro St., Ste. C	Mountain View, CA 94041
	Hon. Cathie Wright (R-19)	California State Senate		2345 Erringer Road, Suite 212	Simi Valley, CA 93065
	Hon. Charles M. Calderon (D-30)	California State Senate		617 W Beverly Blvd.	Montebello, CA 90640
	Hon. Charles Poochigian (R-29)	CA State Assembly		2929 W. Main St., Suite J	Visalia, CA 93291
	Hon. Cruz M. Bustamante (D-31)	CA State Assembly		4144 State Capitol, Room# 2188	Sacramento, CA 95814
	Hon. Curt Pringle (R-68)	CA State Assembly		12865 Main Street, Suite 100	Garden Grove, CA 92640
	Hon. Curtis R. Tucker, Jr. (D-51)	CA State Assembly		One Manchester Blvd.	Inglewood, CA 90306
	Hon. Dan Hauser (D-1)	CA State Assembly		50 "D" Street, Suite 450	Santa Rosa, CA 95404
	Hon. Daniel E. Boatwright (D-7)	California State Senate		1000 Burnett Ave., Suite 130	Concord, CA 94520
	Hon. David G. Kelley (R-37)	California State Senate		73-710 Fred Wanning Dr., #108	Palm Desert, CA 92260
	Hon. David Knowles (R-4)	CA State Assembly		33 Broadway	Jackson, CA 95642
	Hon. DeDe Alpert (D-78)	CA State Assembly		3262 Holiday Ct., #209	La Jolla, CA 92037
	Hon. Debra Bowen (D-53)	CA State Assembly		18411 Crenshaw Bld., #280	Torrance, CA 90504
	Hon. Denise Ducheny (D-79)	CA State Assembly		430 Davidson Street, Suite B	Chula Vista, CA 92010
	Hon. Diane E. Watson (D-26)	California State Senate		4401 Crenshaw Blvd.	Los Angeles, CA 90043
	Hon. Diane Fienstein	Member, U.S. House of Representatives		11111 Santa Monica Blvd. #915	Los Angeles, CA 90025
	Hon. Diane Martinez (D-49)	CA State Assembly		320 S. Garfield Ave. Suite 202	Alhambra, CA 90801
	Hon. Dick Monteith (D-12)	California State Senate		1020 15th Street, Suite B	Modesto, CA 95354
	Hon. Dominic L. Cortese (D-23)	CA State Assembly		100 Paseo de San AntonioSte300	San Jose, CA 95113
	Hon. Don Rogers (R-17)	California State Senate		P.O. Box 902725	Palmdale, CA 93590
	Hon. Doris Allen (R-67)	CA State Assembly		5252 Orange Ave., Ste. 100	Cypress, CA 90630
	Hon. Fred Aguiar (R-61)	CA State Assembly		304 West "F" Street	Ontario, CA 91762
	Hon. George House (D-25)	CA State Assembly		1101 Standiford Ave., Ste. B-5	Modesto, CA 95350
	Hon. Grace Napolitano (D-58)	CA State Assembly		12009 E. Firestone Blvd.	Norwalk, CA 90650
	Hon. Henry Mello (D-15)	California State Senate		1200 Aguajito Road	Monterey, CA 93940
	Hon. Herschel Rosenthal (D-20)	California State Senate		1950 Sawtelle Blvd., Suite 210	Los Angeles, CA 90025
	Hon. Hilda Solis (D-24)	California State Senate		101 S. Broadway, Suite 2105	Los Angeles, CA 90012
	Hon. Howard Kaloogian (R-74)	CA State Assembly		2121 Palomar Airport Rd,Ste105	Carlsbad, CA 92009
	Hon. Jack O'Connell (D-18)	California State Senate		1216 State St., Rm 507	Santa Barbara, CA 93101

Lname	Name	Name2	Name3	Street	Citystzip
	Hon. Jackie Speier (D-19)	CA State Assembly		220 S. Spruce Ave., #101	South San Francisco, CA 9408
	Hon. James Rogan (R-43)	CA State Assembly		143 S. Glendale Ave., Ste. 208	Glendale, CA 91205
	Hon. Jan Goldsmith (R-75)	CA State Assembly		12307 Oak Knoll Road, Ste. A	Poway, CA 92064
	Hon. Jim Battin (D-80)	CA State Assembly		72-880 Fred Wring Dr.,Ste. A-4	Pal Desert, CA 92260
	Hon. Jim Brulte (R-63)	CA State Assembly		10681 Foothill Blvd., Ste. 325	Rancho Cucamonga, CA 91730
	Hon. Jim Costa (R-16)	California State Senate		1326 "H" St., Ste. 15	Bakersfield, CA 93301
	Hon. Jim Cunneen (R-24)	CA State Assembly		456 El Paseo de Saratoga	San Jose, CA 95130
	Hon. Jim Morrissen (D-69)	CA State Assembly		12822 Garden Grove Blvd.	Garden Grove, CA 92643
	Hon. Joe Baca (D-62)	CA State Assembly		201 North "E" Street,2nd Floor	San Bernardino, CA 92401
	Hon. John L. Burton (D-12)	CA State Assembly		455 Golden Gate Ave. Ste. 2202	San Francisco, CA 94102
	Hon. John R. Lewis (R-33)	California State Senate		1940 W. Orangewood Ave., #106	Orange, CA 92668
	Hon. John Vasconcellos (D-22)	CA State Assembly		100 Paseo de San AntonioSte106	San Jose, CA 95113
	Hon. Juanita M. McDonald (D-55)	CA State Assembly		1 Civic Plaza Dr., Ste. 320	Carson, CA 90745
	Hon. Keith Olberg (R-34)	CA State Assembly		540 Perdew, Room 1A	Ridgecrest, CA 93555
	Hon. Kenneth L. Maddy (R-14)	California State Senate		895 Napa Ave #A-6	Morro Bay, CA 93442
	Hon. Kerry Mazzoni (D-6)	CA State Assembly		100 Smith Ranch Rd., Ste. 308	San Rafael, CA 94903
	Hon. Kevin Murray (D-47)	CA State Assembly		3683 Crenshaw Blvd., 5th Floor	Los Angeles, CA 90016
	Hon. Larry Bowler (R-10)	CA State Assembly		10381 Old Placeville Rd Ste120	Sacramento, CA 95827
	Hon. Leroy F. Greene (D-6)	California State Senate		P.O. Box 254646	Sacramento, CA 95825
	Hon. Liz Figueroa (D-20)	CA State Assembly		39650 Liberty St. Ste. 160	Fremont, CA 94538
	Hon. Louis Caldera (D-46)	CA State Assembly		304 South Broadway, Ste. 580	Los Angeles, CA 90013
	Hon. Lucy Killea (I-39)	California State Senate		2550 5th Ave., Suite 152	San Diego, CA 92103
	Hon. Marguerite Archie-Hudson (D-48)	CA State Assembly		700 State Dr., #103	Los Angeles, CA 90037
	Hon. Marian Bergeson (R-35)	California State Senate		140 Newport Center Dr, #120	Newport Beach, CA 92660
	Hon. Marilyn Brewer (R-70)	CA State Assembly		4667 MacArthur Blvd.,Suite 201	Newport Beach, CA 92660
	Hon. Martha Escutia (D-50)	CA State Assembly		3512 East Florence Ave.Ste.201	Huntington Park, CA 90255
	Hon. Martin Gallegos (D-57)	CA State Assembly		218 North Glendora, Suite D	La Puente, CA 91744
	Hon. Maurice Johannessen	California State Senate			
	Hon. Mickey Conroy (R-71)	CA State Assembly		1940 N. Tustin,#102	Orange, CA 92665
	Hon. Mike Machado (R-17)	CA State Assembly		31 E. Channel St., Ste. 306	Stockton, CA 95202
	Hon. Mike Sweeney (D-18)	CA State Assembly		2450 Washington Ave.	San Leandro, CA 94577
	Hon. Mike Thompson (D-2)	California State Senate		50 D Street, Room 120A	Santa Rosa, CA 95404
	Hon. Milton Marks (D-3)	California State Senate		711 Van Ness Ave., Suite 310	San Francisco, CA 94102
	Hon. Nao Takasugi (R-37)	CA State Assembly		221 Daily Dr., Ste. 7	Camarillo, CA 93010
	Hon. Newton R. Russell (R-21)	California State Senate		401 North Brand Blvd.Suite 424	Glendale, CA 91203
	Hon. Nicholas C. Petris (D-9)	California State Senate		1970 Broadway, Suite 1020	Oakland, CA 94612
	Hon. Patrick Johnston (D-5)	California State Senate		31 E Channel, Room 440	Stockton, CA 95202
	Hon. Paul Horcher (R-60)	CA State Assembly		325 N. Azuza Ave.	West Covina, CA 91791
	Hon. Paula L. Boland (R-38)	CA State Assembly		10727 White Oak, Ste. 124	Granada Hills, CA 91344
	Hon. Peter Frusetta (D-28)	CA State Assembly		365 Victor St., Ste. L	Salinas, CA 93906
	Hon. Phil Hawkins (D-56)	CA State Assembly		4425 Atlantic Ave., Suite B-22	Long Beach, CA 90807
	Hon. Phillip Isenberg (D-9)	CA State Assembly		121 15th St., Ste. 102	Sacramento, CA 95814
	Hon. Quentin Kopp (I-8)	California State Senate		363 El Camino Real, Suite 205	S San Francisco, CA 94080
	Hon. Ralph C. Dills (D-28)	California State Senate		16921 S. Western Ave.Suite 201	Gardena, CA 90247
	Hon. Ray Haynes (D-36)	California State Senate		3600 Lime St., Room 111	Riverside, CA 92501
	Hon. Richard K. Rainey (R-15)	CA State Assembly		1948 Mt. Diablo Blvd.	Walnut Creek, CA 94596

Lname	Name	Name2	Name3	Street	Citystzip
	Hon. Richard Katz (D-39)	CA State Assembly		9140 Van Nuys Blvd., Ste. 109	Panorama City, CA 91402
	Hon. Richard Mountjoy (R-29)	California State Senate		111 Pacifica, Suite 210	Irvine, CA 92718
	Hon. Richard Mountjoy (R-59)	CA State Assembly		208 North First Ave.	Arcadia, CA 91006
	Hon. Richard Polanco (D-22)	California State Senate		6150 Van Nuys Blvd., Suite 400	Van Nuys, CA 91401
	Hon. Rob Hurtt (R-34)	California State Senate		11642 Knott Street, Suite 8	Garden Grove, CA 82641
	Hon. Robert G. Beverly (R-27)	California State Senate		1611 S. Pacific Coast Hwy,#102	Redondo Beach, CA 90277
	Hon. Robert J. Campbell (D-11)	CA State Assembly		815 Estudillo St.	Martinez, CA 94553
	Hon. Ross Johnson (R-72)	CA State Assembly		1501 N. Harbor Blvd.,Suite 201	Fullerton, CA 92635
	Hon. Ruben S. Ayala (D-32)	California State Senate		9620 Center Ave, Suite 100	Rancho Cucamonga, CA 91730
	Hon. Sal Cannella (D-26)	CA State Assembly		384 E. Olive St., Ste. #2	Turlock, CA 95380
	Hon. Sheila Kuehl (D-41)	CA State Assembly		16130 Ventura Blvd., Ste. 230	Encino, CA 91436
	Hon. Steve Baldwin (D-77)	CA State Assembly		3293 Olive Ave.	Lemon Grove, CA 91945
	Hon. Steve KuyKendall (D-54)	CA State Assembly		211 East Ocean Blvd., Ste. 300	Long Beach, CA 90802
	Hon. Steve Peace (D-40)	California State Senate		430 Davidson St., Suite C	Chula Vista, CA 92010
	Hon. Susan Davis (D-76)	CA State Assembly		1080 University Ave. Ste.H-201	San Diego, CA 92103
	Hon. Ted Weggeland (R-64)	CA State Assembly		6840 Indiana Ave., Ste. 150	Riverside, CA 92506
	Hon. Teresa Hughes (D-25)	California State Senate		One Manchester Blvd., Ste. 401	Ingelwood, CA 90301
	Hon. Thomas W. Hannigan (D-8)	CA State Assembly		844 Union Ave., Suite A	Fairfield, CA 94533
	Hon. Tim Leslie (R-1)	California State Senate		1200 Melody Lane, Suite 110	Roseville, CA 95678
	Hon. Tom Bates (D-14)	CA State Assembly		3923 Grand Ave.	Oakland, CA 94610
	Hon. Tom Bordonard (R-33)	CA State Assembly		523 Higuera St.	San Luis Obispo, CA 93401
	Hon. Tom Campbell (R-11)	California State Senate		750 Menlo Ave., Suite 100	Menlo Park, CA 94025
	Hon. Tom Hayden (D-23)	California State Senate		10951 W. Pico Blvd., #202	Los Angeles, CA 90064
	Hon. Tom Woods (R-2)	CA State Assembly		410 Hemsted Dr., Suite 210	Redding, CA 96002
	Hon. Trice Harvey (R-32)	CA State Assembly		1800 30th St., Ste. 101	Bakersfield, CA 93301
	Hon. Valerie Brown (D-7)	CA State Assembly		50 D Street, Ste. 301	Santa Rosa, CA 95404
	Hon. Wally Knox (D-42)	CA State Assembly		8425 W. Third St., #406	Los Angeles, CA 90048
	Hon. Willard H. Murray, Jr. (D-52)	CA State Assembly		16444 Paramount Blvd., Ste 100	Paramount, CA 90723
	Hon. William A. Craven (R-38)	California State Senate		2121 Palomar Airport Rd., #100	Carlsbad, CA 92008
	Hon. William J. "Pete" Knight (R-36)	CA State Assembly		1529 E. Palmdale Blvd.Ste. 308	Palmdale, CA 93550
	Hon. Willie L. Brown Jr. (D-13)	CA State Assembly		107 S. Broadway, I Ste. 8009	Los Angeles, CA 90012
	Metropolitan Water District of So. Calif	Attn: Jaime Paz		3972 Valley View	Yorba Linda, CA 92686
Abubo	Mr. Melchor			30-886 Roseview Lane	Thousand Palms, CA 92276
Ackert	Ron Ackert			P.O. Box 3251	North Shore, CA 92254-0986
Acuna, Jr.	Mr. Joey			52-280 Calle Camacho	Coachella, CA 92236
Adams	Mr. B.			P.O. Box 127	Cathedral City, CA 92235
Adams	Ms. Hallie McG.			81-649 Shadow Avenue	Indio, CA 92201
Affeldt	Dean	PRA Group		2495 Industiral Parkway West	Hayward, CA 94545
Ahee	Carl & Lorraine			22853 B Nadine Ct	Torrance, CA 90505
Aiken	Patti & Tom	# 6 Stubblefield Drive		P.O. Box 375	Desert Center, CA 92239
Allen	Helen			PO Box 31	Desert Center, CA 92239
Allen	Mr. & Mrs. Hugh			18-853 Killoch Way	Northridge, CA 91326
Allen	Mr. Jose R.	Skadden, Arps, Slate, Meagher		Four Embarcadero Center	San Francisco, CA 94111-4144
Altman	Ms. Irene			475 Valmonte Sur	Palm Springs, CA 92262

Lname	Name	Name2	Name3	Street	Citystzip
Alvarez	Mr. Pedro G.			83-462 Emerald Street	Indio, CA 92201
Amacher	Robert			44101 Crystal Way	Desert Center, CA 92239
Amesbury	Mr. Bruce H.			7105 Sultana Avenue	San Gabriel, CA 91775
Amy	John Amy			P.O. Box 1208	Indio, CA 92202
Anderson	Colleen			1251 W. Edgehill Drive	San Bernardino, CA 92405
Anderson	Eugene	Dept. of Anthropology	University of Calif		Riverside, CA 92521
Anderson	Jim			6452 Olive Street	San Bernardino, CA 92407
Anderson	Mr. Michael			899 Gran Via Valmonte	Palm Springs, CA 92262
Anderson	Robert & Ruth			P.O. Box 495	Desert Center, CA 92239-049
Anderson	Timmothy W.			P.O. Box 497	Desert Center, CA 92239
Araiza	Ms. Michelle			13-555 Via Real	Desert Hot Springs, CA 92240
Army	Dept. of Army - L.A. District	Corp. of Engineers - Navigation		P.O. Box 2711	Los Angeles, CA 90053
Aron	Mr. & Mrs. Norman			270 Running Spring	Palm Desert, CA 92260
Asler	Mr. Ben			76-592 Hollyhock	Palm Desert, CA 92660
Athey	Mr. Harold			76-126 Imations Circle	Palm Desert, CA 92660
Atwood	Sam	The Sun, Environmental Rpt		399 N "D" St.	San Bernardino, CA 92401
Audubon	Larry LaPre	Chairman, Audubon Society		4178 Chestnut St.	Riverside, CA 92501
Ayotte	Ms. Donna			40-200 Sagewood Drive	Palm Desert, CA 92260
Bacca	Ms. Agnes			83-048 Lupine	Indio, CA 92201
Bacigalupo	Mark & Paz			PO Box 264	Desert Center, CA 92239
Bacon	Ms. Nancy H.			1990 Centro West	Tiburon, CA 94920
Badgley	Mrs. Marjorie			76-736 Chrysanthemum Way	Palm Desert, CA 92260
Bailey	Amber L.			450 C Golden Springs Rd.	Diamond Bar, CA 91765
Baker	Bill	U.S. Member, House of Representatives		1801 N. California Blvd.	Walnut Creek, CA 94596
Baker	Mr. George			P.O. Box 37	La Quinta, CA 92253
Baker	Ms. Gail			12182 12th Street	Yucaipa, CA 92399
Baker	Ms. Kristy G.			P.O. Box 37	La Quinta, CA 92253
Baker	Roger			Land Yacht Harbor #85	Desert Center, CA 92239
Baker	Shawn & Ruth			PO Box 584	Desert Center, CA 92239
Balin	Mr. & Mrs. Nathan			38-604 Wisteria Drive	Palm Desert, CA 92660
Bancroft	Mr. Vic			38-780 Desert Greens Drive, W.	Palm Desert, CA 92260
Bancroft	Ms. Helen P.			38-780 Desert Greens Drive, W.	Palm Desert, CA 92260
Banez	Ms. Joanne C. J.			81-375 Green Avenue	Indio, CA 92201
Barlow	Ken & Thelma			PO Box 602	Desert Center, CA 92239
Barshop	Ms. Ruthann			P.O. Box 606	Palm Desert, CA 92261-0606
Baumann	Ms. Gail			55-073 Pueblo, Apt. 1	Yucca Valley, CA 92284
Bayer	Ms. Carol			700 Camino Norte	Palm Springs, CA 92262
Becerra	Xavier	U.S. Member, House of Representatives		2435 Colorado Blvd., #200	Los Angeles, CA 90041
Beers	John C.			240 S. Anza St., Apt P	El Cajon, CA 92020
Beidler	Ms. Marilyn			P.O. Box 304	La Quinta, CA 92253
Beilenson	Anthony	U.S. Member, House of Representatives	Attn: Diane Brown	21031 Ventura Blvd. Ste 1010	Woodland Hills, CA 91364
Bell	Ms. Jane L.			338-1/2 N. 5th Street	Blythe, CA 92225
Bellamy	John & Betty			Land Yacht Harbor #129	Desert Center, CA 92239

Lname	Name	Name2	Name3	Street	Citystzip
Bellamy	John & Betty			PO Box 932	Qualicum Beach, CANADA VOR2T
Bellomo	Mr. Angelo J.			652 Windswept	Simi Valley, CA 93065
Benner	Betty			#80 Stubblefield Drive	Desert Center, CA 92239
Bennett	Ms. Deborah M.			26-410 Ironwood	Ironwod, CA 92555
Beno	Craig	Equipment Rentals		1748 Orangewood	Upland, CA 91786
Berger	Ms. Helene			40-333 Sagewood Drive	Palm Desert, Ca 92260
Berman	Howard	U.S. Member, House of Representatives	Attn: Fausto Capoblanca	14600 Roscoe Blvd., Ste. 506	Panorama City, CA 91402
Berman	Mrs. Helen E.			3 Deerfield Court	Rancho Mirage, CA 92270
Bighorn	Soc. Conserv. Bighorn Sheep	Attn: James DeForge		401 N. Garfield	Alhambra, CA 91801
Bilbray	Brian	U.S. Member, House of Representatives		1011 Camino Del Rio #330	San Diego, CA 92108
Bixen	Ms. Mary			76-661 Daffodil Drive	Palm Desert, CA 92260
Blackford	George			PO Box 347	Desert Center, CA 92239
Blackstone	George & Janice			83-935 Hopi Avenue	Indio, CA 92201
Blanton	Ms. Dorothy J.			34-604 Stage Drive	Thousand Palms, CA 92276
Blinzler	F. L.			P.O. Box 532	Desert Center, CA 92239
Bliss	Ms. Catherine & Liza			43-376 Cook Street, #127	Palm Desert, CA 92260
Boehm	Henry			PO Box 1229	Yucaipa, CA 92399
Boggs	Gilmer G.			2855 Carlsbad Blvd	Carlsbad, CA 92008
Bono	Sonny	U.S. Member, House of Representatives		1555 S. Palm Canyon #G101	Palm Springs, CA 92264
Borquez	John & Kristen			PO Box 107	Desert Center, CA 92239
Borunda	George & Ann			826 Palo Verde	Desert Center, CA 92239
Bostwik	J.			217 A Pennsylvania Ave.	Glendora, CA 91740
Boyd	Charles G.			7548 Lakeside Drive	Riverside, CA 92509
Boyd	Mr. Frank			32-276 Zinnia lane	Palm Desert, CA 92660
Boylan	Glen E. and Shirley M.			P.O. Box 107	Desert Center, CA 92239
Branson	Darrell & Dianne			PO Box 107	Desert Center, CA 92239
Brawley	City of	Attn: Patrick Murphy		400 Main St.	Brawley, CA 92227
Brea	City of			#1 Civic Center Circle	Brea, CA 92621
Brees	Maxine			PO Box 523	Desert Center, CA 92239
Bridges	Ms. Catherine D.			163 Madrid Avenue	Palm Street, CA 92260
Broder	Ms. Ilene			76-594 Rudy Court	Palm Desert, Ca 92260
Brooks	Rodney & Patsy			925 Verbena	Desert Center, CA 92239
Brown	Margaret			PO Box 153	Desert Center, CA 92239
Brown, Jr	George	U.S. Member, House of Representatives	Attn: Wilmer Carter	657 La Cadena Drive	Colton, CA 92324
Brunstad	Olaf			P.O. Box 364	Desert Center, CA 92239
Brunton	George & Irene			PO Box 485	Desert Center, CA 92239
Brunton	Jim & Jery			PO Box 475	Desert Center, CA 92239
Brush	Noel & Jean			PO Box 456	Desert Center, CA 92239
Bryan	Mr. & Mrs. Rod			76-464 Violet Circle	Palm Desert, CA 92260
Bryant	Gary			PO Box 167	Desert Center, CA 92239
Buchannan	Ms. Mary J.			54-349 Inverness	La Quinta, CA 92253
Burbidge	Gene			General Delivery	Desert Center, CA 92239
Burdick	LeRoy & Ruth			PO Box 513	Desert Center, CA 92239

Lname	Name	Name2	Name3	Street	Citystzip
Burg	Mr. Carolyn			677 N. Calle Rolph	Palm Springs, CA 92262
CA Assn	CA Assn of 4WD Clubs	Attn: R.S. MacPherson		3660 Valencia Hills Dr.	Riverside, CA 92507
CA Fed	CA Fed of Mineralogical Socs	Attn: Hal Pelfrey		9612 Rosebay	Anaheim, CA 92804
CVAG	Coachella Valley Assoc. of Governments	Attn: Patricia "Corky" Larson		74-133 El Paseo, Ste. 4	Palm Desert, CA 92260
Calderon	Anastacio Calderon			P.O. Box 423	Desert Center, CA 92239
Calderon	Ms. Eva			P.O. Box 263	Cathedral City, CA 92235
Calif	Air Resources Board	Attn: Evaluation & Planning		1709 11th St.	Sacramento, CA 95814
Calif	CA Dept. Fish & Game	Attn: Mike Guisti		P.O. Box B-P	Blythe, CA 92225
Calif	CA Energy Commission	Siting & Environmental Div		1516 9th St., MS-44	Sacramento, CA 95814
Calif	CA Highway Patrol	Long Range Planning		2555 First Ave., Box 898	Sacramento, CA 95804
Calif	CA Office of Planning & Resear	David C. Nunendamp, Chief OPA		1400 Tenth St.	Sacramento, CA 95814
Calif	CA State Dept. of Parks & Rec	Resource Protection Div.	Attn: James Doyle	P.O. Box 942896	Sacramento, CA 94296-0001
Calif	CA State Historic Preservation	Attn: Jeff Bingham		1416 9th St., Rm. 1153	Sacramento, CA 95814
Calif	CA State Lands Commission			1807 13th St.	Sacramento, CA 95814
Calif	CA State Resource Agency	Attn: Gordon A. VanVleck		1416 9th St.	Sacramento, CA 95814
Calif	Calif. Dept. Of Fish & Game	Attn: Patricia Wolf (Acting)		330 Golden Shore, Ste. 50	Long Beach, CA 90802
Calif	Calif. Dept. of Conservation			801 K St. MS 09-06	Sacramento, CA 95814-3529
Calif	Calif. Dept. of Corrections	Attn: Michael Badstubner		1840 E. 17th St.	Santa Ana, CA 92701
Calif	Calif. Dept. of Food & Agriculture			1220 N. St., Rm. 104	Sacramento, CA 95814
Calif	Calif. Dept. of Public Health			744 "P" St.	Sacramento, CA 95814
Calif	Calif. Highway Patrol	Riverside Office		8118 Lincoln Ave.	Riverside, CA 92504
Calif	Calif. Integrated Waste Management Board			1020 Ninth St., Rm. 300	Sacramento, CA 95814
Calif	Calif. Native Plant Society	Attn: Karen Kirtland		1 Park Plaza, Ste. 500	Irvine, CA 92714
Calif	Calif. Reclamation Board			1416 Ninth St.	Sacramento, CA 95814
Calif	Calif. St. Mining & Geology Board			801 K St MS 24-05	Sacramento, CA 95814-3528
Calif	Calif. State Lands Commission	Attn: Greg Pelka		245 W. Broadway, Ste. 425	Long Beach, CA 90802-4471
Calif	D.J. Everitts	State Lands Commission		245 West Brodway #425	Long Beach, CA 90802
Calif	Gordon Duffy	Air Resources Board		P.O. Box 2815	Sacramento, CA 95812
Calif	Ms. Elain Russell, Supervisor	Environmental & Special Proj. Section	Calif. Public Utilities Comm.	505 Van Ness Ave.	San Francisco, CA 94102
Calif	Ms. Kathryn Gualtieri	State Historic Preservation Officer		P.O. Box 942896	Sacramento, CA 94296
Calif	State of California	The Resource Agency Secretary		1416 Ninth St., Rm. 1311	Sacramento, CA 95814
Calif	Water Quality Control Board	Colorado River Basin Region 7		73-271 Highway 111, Ste. 21	Palm Desert, CA 92260
Calif. Riverside	University of	Attn: Environ Science		900 University Dr.	Riverside, CA 92521
California	Calif. Wilderness Coalition			2655 Portage Bay East, #5	Davis, CA 95616
Caltrans	CALTRANS	Desert Center Office		129476 Ragsdale Rd.	Desert Center, CA 92239
Caltrans	CALTRANS	Office of Environmental Affairs		650 Howe Ave., Ste. 400	Sacramento, CA 95814
Caltrans	CALTRANS	Regional Maintenance Office		6833 Indiana Ave.	Riverside, CA 92506
Calvert	Ken	U.S. Member, House of Representatives		3400 Central Ave, Suite 200	Riverside, CA 92506
Campbell	Fred & Wanda			PO Box 143	Desert Center, CA 92239

Lname	Name	Name2	Name3	Street	Citystzip
Cannala	Ann Marie			PO Box 516	Desert Center, CA 92239-0516
Cannata	Louis			25550 Kaiser Road	Desert Center, CA 92239
Canton	Mr. Carlos A.			P.O. Box 1396	Palm Springs, CA 92263
Cantu	Saul & Ismael			P.O. Box 548	Desert Center, CA 92239
Capp	Gladys Capp			P.O. Box 206	Desert Center, CA 92239
Capp	James & June			P.O. Box 343	Desert Center, CA 92239
Carl	James & Betty			3085 17Th St	Sacramanto, CA 95818
Carlson	Mr. Dean			38-750 Paradise Way	Cathedral City, CA 92234
Carlson	Mr. Paul			7341 Ronnie Lane	Loomis, CA 95650
Carmichael	S. Carmichael			2419 Lanterman Ter.	Los Angeles, CA 90039
Carnata	Ann Marie			P.O. Box 516	Desert Center, CA 92239
Carney	Chev & Clarissa			P.O. Box 411	Desert Center, CA 92239
Carter	Mr. Nick V.R.			35-523 Canteen	Thousand Palms, CA 92276
Castillo	Ms. Vicky Lynn			11-880 Arliss Drive	Grand Terrace, CA 92324
Castor	Jerry & Peggy			PO Box 502	Desert Center, CA 92239
Castor	Laura			PO Box 563	Desert Center, CA 92239
Cater	Mr. Diana			77-760 Michigan Drive, G1	Palm Desert, Ca 92260
Caygill	Ms. Jennifer			53-060 Obregon	La Quinta, CA 92253
Ceasar	Ms. Darelyn			53-595 Juarez Avenue	La Quinta, CA 92253
Charpied	Donna & Larry			P.O. Box 321	Desert Center, CA 92239
Chase	Mr. Lawrence			45-195 Tomlin Way	Indio, CA 92201
Chiriaco	JR			#One Chiriaco Road	Chiriaco Summit, CA 92201
Chuckwalla Valley	Citizens for the			P.O. Box 397	Desert Center, CA 92239
Clair	Mr. Thomas St.			73-251 Joshua Tree	Palm Desert, CA 92260
Clark	Ms. Linda			51-735 Ave Diaz	La Quinta, CA 92253
Claypool	Henry & Katie			130 Hilfiker Dr	Arcata, CA 95521
Claypool	Henry & Katie			LYH #64	Desert Center, CA 92239
Clute	Assemblyman Steve	State Capitol		P.O. Box 942849	Sacramento, CA 94249-0001
Clute	Mr. Steve	Desert Protection Fund		73790 El Paseo, Suite B-200	Palm Desert, CA 92260
Coe	Bill & Emma			LYH #47	Desert Center, CA 92239
Colburn	Mr. Kevin			74-066 Catalina Way	Palm Desert, CA 92260
Comer	Joe			43641 Tamarisk	Desert Center, CA 92239
Comer	Joe & Mary			PO Box 165	Desert Center, CA 92239
Commerce	Commerce Planning Dept.			2535 Commerce Way	Commerce, CA 90040
Commission	Public Utilities	Attn: Environ. Section		505 Van Ness Ave. Rm. 2	San Francisco, CA 94102
Community	Community Services District	Southern Coachella Valley		P.O. Box 302	Thermal, CA 92274
Condit	Gary	U.S. Member, House of Representatives		415 West 18th Street	Merce, CA 95340
Conrad	Mr. Marcus			P. O. Box 1342	Palm Desert, CA 92261
Conservation Assoc.	National Parks &			Box 67	Cottonwood, AZ 86326
Control Board	California Regional Water Quality			73-720 Fred Warning Dr.,Ste100	Palm Desert, CA 92260
Conyer	Chris & Debi			PO Box 107	Desert Center, CA 92239
Cook	Estelle & Roy			Land Yacht Harbor #12	Desert Center, CA 92239
Coon	Mr. Johnny			Box 436	Desert Center, CA 92239
Cooper	Ms. DeAnna L.			81-620 Shadow Avenue	Indio, CA 92201
Costello	Ms. Amy			P.O. Box 1018	Cabazon, CA 92230

Lname	Name	Name2	Name3	Street	Citystzip
Cothron	Mrs. Esther R.			82-099 Sunset Court	Indio, CA 92201
Coundures	John M.			2364 Indiana Ave.	Perris, CA 92370
County Museum	San Bernardino	Attn: Bio Science Dept. Bob McKiernan		2024 Orangetree Lane	Redlands, CA 92374
County of Riverside	Riverside Co. Dept. of Building & Safety	Tony Harmon	Principal Engineering Technician	P.O. Box 1440	Riverside, CA 92502-1440
County of Riverside	Riverside Co. Economic Devel. Agency	Bradley Hudson	?	P.O. Box 1180	Riverside, CA 92502
County of Riverside	Riverside Co. Fire Dept.-Main Office	Dan Wagner	Fire Safety Specialist	3760 12th St.	Riverside, CA 92501
County of Riverside	Riverside Co. Planning Dept.-Desert Offi	Paul Clark	Senior Planner	79-733 County Club Dr., Ste E	Bermuda Dunes, CA 92201
County of Riverside	Riverside Co. Waste Resour. Manag. Dist.	Robert Nelson	Chief Executive Officer	1995 Market St.	Riverside, CA 92501-1719
County of Riverside	Riverside County Administrative Office	Richard Lashbrook	Director of Policy Planning	P.O. Box 3651	Riverside, CA 92501-3651
County of Riverside	Riverside County Board of Supervisors	1st District Supervisor	Bob Buster	P.O. Box 3656	Riverside, CA 92501-3656
County of Riverside	Riverside County Board of Supervisors	2nd District Supervisor	John Tavaglione	P.O. Box 3656	Riverside, CA 92501-3656
County of Riverside	Riverside County Board of Supervisors	3rd District Supervisor	Kay Ceniceros	P.O. Box 3656	Riverside, CA 92501-3656
County of Riverside	Riverside County Board of Supervisors	4th District Supervisor	Roy Wilson	P.O. Box 3656	Riverside, CA 92501-3656
County of Riverside	Riverside County Board of Supervisors	5th District Supervisor	Tom Mullins	P.O. Box 3656	Riverside, CA 92501-3656
County of Riverside	Riverside County Environ. Health Dept.	Laurie Holk	Environmental Health Specialist	79733 County Club Dr., Suite D	Bermuda Dunes, CA 92201
County of Riverside	Riverside County Environ. Health Dept.	Ralph Luchs	Supervisor, Local Enforcement Agency	?	Riverside, CA ?
County of Riverside	Riverside County Flood Control Dist.	Stuart McKibbin	Associate Civil Engineer	1995 Market St.	Riverside, CA 92501
County of Riverside	Riverside County Parks District	Jeff Weinstein	?	P.O. Box 3507	Riverside, CA 92519-3507
County of Riverside	Riverside County Planning Commission	1st Dist. Commissioner - John Roth	c/o D. Ablard, Planning Commission Sec.	P.O. Box 1409	Riverside, CA 92501-1409
County of Riverside	Riverside County Planning Commission	2nd Dist. Commissioner - John Snell	c/o D. Ablard, Planning Commission Sec.	P.O. Box 1409	Riverside, CA 92501-1409
County of Riverside	Riverside County Planning Commission	3rd Dist. Commissioner - Marianne Kelley	c/o D. Ablard, Planning Commission Sec.	P.O. Box 1409	Riverside, CA 92501-1409
County of Riverside	Riverside County Planning Commission	4th Dist. Commissioner - Cydronia Valdez	c/o D. Ablard, Planning Commission Sec.	P.O. Box 1409	Riverside, CA 92501-1409
County of Riverside	Riverside County Planning Commission	5th Dist. Commissioner - Theresa Canady	c/o D. Ablard, Planning Commission Sec.	P.O. Box 1409	Riverside, CA 92501-1409
County of Riverside	Riverside County Planning Department	Aleta Laurence, AICP	Planning Director	P.O. Box 1409	Riverside, CA 92501-1409
County of Riverside	Riverside County Planning Department	David Mares	Senior Planner	P.O. Box 1409	Riverside, CA 92501-1409

Lname	Name	Name2	Name3	Street	Citystzip
County of Riverside	Riverside County Planning Department	Ron Goldman	Principal Planner	P.O. Box 1409	Riverside, CA 92501-1409
County of Riverside	Riverside County Sheriff's Dept.	Deputy Stewart		4050 Main St.	Riverside, CA 92502
County of Riverside	Riverside County Transportation Dept.	Russ Garrett	Senior Engineering Technician	1695 Spruce Street	Riverside, CA 92507
Courtenay	Walter Courtenay, Jr.	Soc. Ichthyol & Herpetol			Boca Raton, CA 33431
Cox	Christopher	U.S. Member, House of Representatives	Attn: Jim Fournier	4000 MacArthur E. Tower # 430	Newport Beach, CA 92660
Crane	Jacqueline			PO Box 474	Desert Center, CA 92239
Crane	Mr. D.			3400 Tahquitz-Cyn, Suite 207	Palm Springs, CA 92262
Crawford	Mrs. Pat			76-275 Dahcia	Palm Desert, CA 92260
Crooks	Ms. Mary			P.O. box 97982	Las Vegas, NV 89193
Crowder	Ms. Ledesa L.			71-760 San Jacinto Drive, #204	Rancho Mirage, CA 92270
Crowell	Ms. Jerrie I.			68-295 Verano Road	Cathedral City, CA 92234
Cruz	Ms. Nancy			40-692 Thunderbird Road	Rancho Mirage, CA 92270
Cuddell	Mr. Todd			43-541 Old Harbor Drive	Indio, CA 92201
Cunningham	Randy "Duke"	U.S. Member, House of Representatives		613 W Valley Parkway, #320	Escondido, CA 92025
Curtis	Howard & Helen			43551 Ragsdale Road	Desert Center, CA 92239
Czerniak	Martin T. Czerniak	Converse Environmental West		67 West Bellevue Dr., Ste. B	Pasadena, CA 90802
DAC	Frank Grace			P.O. Box 734	Desert Center, CA 92239
DAC	James R. Bagley			P.O. Box 219	Twentynine Palms, CA 92277
DAC	Mr. Glenn Sudmeier			Star Route, Box 4-C	Hesperia, CA 92345
DAC	Mr. Richard Milanovich			960 East Tahquitz Way #106	Palm Springs, CA 92262
DAC	Mrs. Sharon Apfelbaum			523 Camino del Sur	Palm Springs, CA 92262
DAC	Mrs. Susan Hickman			P.O. Box 36	Yermo, CA 92398
DACX	Clayton Record			830 N. Lyon Ave.	San Jacinto, CA 92383
Dalipagic	Ms. Dina			43-135 Washington St., #39	Palm Desert, CA 92260
Dash	Ms. Ruth E.			P.O. Box 4491	Palm Springs, CA 92263
Davis	Dr. E. R. & Sylvia			42-705 Warner Trail	Palm Desert, CA 92260
Davis	Mr. Dan L.			29 Cueta Drive	Rancho Mirage, CA 92270
Davis	Ms. Dani			P.O. Box 1339	Palm Springs, CA 92263
DeFrancesco	Mr. & Mrs. Joseph			54-185 Ave Madero	La Quinta, CA 92253
Decamp	Gordon & Ruth			933 Diamond Street #14	San Diego, Ca 92109
Defenders	Defenders of Wildlife	Attn: Richard Spotts		5604 Rosedale Ave.	Sacramento, CA 95822
Defense Council	Natural Resources			71 Stevenson Street	San Francisco, CA 94105
Delano	Ms. Kim			P.O. Box 567	Blythe, CA 92226
Delgado	Ms. Sharon			71-381 Biskra	Rancho Mirage, CA 92270
Dellums	Ronald	U.S. Member, House of Representatives		201-13th Street, Ste. #105	Oakland, CA 94612
Deniz	Juan & Romana			PO Box 406	Desert Center, CA 92239
Dept Regional	Dept Regional Planning	1390 Hall of Record		320 W. Temple St.	Los Angeles, CA 90012
Dept. of Water	Department of Water & Power	Carl Hasse, Ass't Engr., PD & C		P.O. Box 111, Rm 1004	Los Angeles, CA 90051
Desert	Desert Bighorn Council			P.O. Box 5431	Riverside, CA 92517
Desert	Desert Center Unified School Dist.			1434 Kaiser Rd.	Eagle Mountain, CA 92241

Lname	Name	Name2	Name3	Street	Citystzip
Desert	Desert Fisheries Council			407 W. Line St.	Bishop, CA 93514
Desert	Desert Protective Council	Attn: Howard & Harriet Allen		3750 El Canto Dr.	Spring Valley, CA 91977
Desert	Desert Tortoise Council			P.O. Box 1738	Palm Desert, CA 92261
Desert	Desert Tortoise Preserve Comm			P.O. Box 453	Ridgecrest, CA 93555
Desert	Desert Water Agency			P.O. Drawer 1707	Palm Springs, CA 92263
Diaz	Mr. Tony			46-883 Lilac Court	Indio, CA 92201
Diaz	Ms. Penelope			83-175 Rue Paray	Thermal, CA 92274
Dickson	Wanahda & Louis			4976 Bermuda Dunes	Banning, CA 92220
Dixon	Julian	U.S. Member, House of Representatives	Attn: Patricia Miller	5100 W. Goldleaf Circle #208	Los Angeles, CA 90056
Dobbs	Frank E.			P.O. Box 323	Desert Center, CA 92239
Donahue	Timothy			15 Barroilhet Ave	San Mateo, CA 94401
Dooley	Calvin	U.S. Member, House of Representatives		224 Lacey Blvd.	Hanford, CA 93239
Doolittle	John	U.S. Member, House of Representatives		2130 Professional Dr., St.#190	Roseville, CA 95661
Dornan	Robert	U.S. Member, House of Representatives	Attn: Patricia Fanelli	300 Plaza Alicante, Suite 360	Garden Grove, CA 92640
Dougherty	Mr. Michael A.			40-870 Centennial Circle	Palm Desert, CA 92260
Douglass	Ms. Diane			1168 Edgar	Beaumont, CA 92223
Dow	Mr. Kenneth R.			31-215 Whispering Palms Trail	Cathedral City, CA 92234
Down	Ms. Sharon			68-555 Iroquois Street	Cathedral City, CA 92234
Dreier	David	U.S. Member, House of Representatives	Attn: Mark Harmsen	112 North Second Ave	Covina, CA 91723
Druett	Fred & Eloise			PO Box 7074	Desert Center, CA 92239
Dukic	Ms. Juli			136 Vista Paseo	Palm Desert, CA 92260
Duncan	Vi			PO Box 467	Desert Center, CA 92239-0467
Durham	Mr. & Mrs. Scott			68-138 Verano Road	Cathedral City, CA 92234
EPA	U.S. Environ Protection Agency	Retion IX, Office of Federal Activiti	Atnn: Carolyn Yale	215 Fremont St.	San Francisco, CA 94015
Eco-Watch				300 Ryan Ranch Rd	Sebastopol, CA 95472
Economic	Economic Development Agency	Aviation Unit		P.O. Box 1180	Riverside, CA 92502
Elam	Ms. Clay			77-552 Mountain View	Palm Desert, CA 92260
Engelskirchen	Ms. Alice			P.O. Box 397	Tentynine, Palms, CA 92227
Engle	Claud			26250 Parkview Dr. #85	Desert Center, CA 92239
Erickson	Bob & Beth			Land Yacht Harbor#19 PO BOX248	Desert Center, CA 92239
Eshoo	Anna	U.S. Member, House of Representatives		298 Emerson Street	Palo Alto, CA 94301
Eslinger	Mr. B. A.			27-141 Holland Road	Sun City, CA 92584-9701
Essen	Echo			LYH #106	Desert Center, CA 92239
Evans	William			PO Box 726	Desert Center, CA 92239-0726
Evaro	Ms. Melissa			33-141 Cathedral Canyon, #A	Cathedral City, CA 92234
Farinha	Earnest & Dorothy			400 Sunrise Ave	Crescent City, CA 95531
Farr	Sam	U.S. Member, House of Representatives			
Faught	Mr. William			81-562 Encina Court	Indio, CA 92202
Faulconer	Eldon & Lorna			PO Box 576	Desert Center, CA 92239

Lname	Name	Name2	Name3	Street	Citystzip
Fazio	Vic	U.S. Member, House of Representatives		722B Main Street	Woodland, CA 95695
Feldstein	Mr. Phillip			38-668 Lobelia Circle	Palm Desert, CA 92660
Feldstein	Ms. Jennifer			72-680 Sundown Lane	Palm Desert, CA 92260
Fife	Donald			P.O. Box 1054	Tustin, CA 92681
Fike	Chris & Sheila			1112 Cottonwood	Desert Center, CA 92239
Filner	Bob	U.S. Member, House of Representatives		333 F Street, Suite A	Chula Vista, CA 91910
Fire Department	Cathedral City	Attn: Chief Sowles		32100 Desert Vista	Cathedral City, CA 92234
Fitzpatrick	Ms. Joyce			73-450 Country Club Drive,#160	Palm Desert, CA 92260
Fjeseth	Palmer & Alberta			LYH #42	Desert Center, CA 92239
Fledderjohn	Dean & Sue			835 E. Ave., Apt E	Coronado, CA 92118
Fleischer	Mr. Stanley E.			810 Roje Avenue	Palm Springs, CA 92262
Flis	Mr. Henry G.			73-290 San Carlos Drive	Thousand Palms, CA 92276
Fontana	Fontana Planning Dept.			8353 Sierra Ave.	Fontana, CA 92335
Foreman	Lloyd			RR1 Box 98F	Desert Center, CA 92239
Fowler	Mr. Todd R.			35-091 Vaquero Road	Cathedral City, CA 92234
Friends of Wildlife	Beula Edmiston	Friends of Wildlife		814 W. Markland Dr.	Monterey Park, CA 91754
Frye	Mr. Robert E.			9475 Craver Road	Morongo Valley, CA 92256
Fults	Lois & Jon			3914 Mistral Drive	Huntington Beach, CA 92649
Gacek	Ted & Mary			Land Yacht Harbor #111	Desert Center, CA 92239
Gallegly	Elton	U.S. Member, House of Representatives	Attn: Paula Scheil	300 Esplanade Drive Ste. 1800	Oxnard, CA 93030
Galli	Ms. Sylvia			73-290 San Carlos Drive	Thousand Palms, CA 92276
Galloway	Jack & Kate			LYH #103	Desert Center, CA 92239
Gammon	Mr. Stacy			78-650 Ave 42, #1806	Bermuda Dunes, CA 92201
Garcia	Mr. Herminia M.			P.O. Box 993	Indio, CA 92202-0993
Garrity	Ms. Grentchen			32-275 Aurora Vista, #2	Cathedral City, CA 92234
Garside	Greg & Nancy			26730 Greenvale Way	Desert Center, CA 92239
Garza	Ms. Consuelo			83-657 Mesquite Avenue	Indio, CA 92201
Gas Company	Southern California			P.O. Box 3003	Redlands, CA 92373-0306
Gattinella	Ms. Raquel			909 Anza	Palm Springs, CA 92264
Gavaldon	Frank			PO Box 428	Desert Center, CA 92239
Geaslin	Marian			PO Box 547	Desert Center, CA 92239
Gettle	Howard & Doris			911 Edna Court	Rohnert Park, CA 94928
Gierman	Roberta			43551 Ragsdale Rd	Desert Center, CA 92239
Giles	Ted Giles			P.O. Box 511	Desert Center, CA 92239
Gilstrap	Mr. Matt			31-070 Ave Alvera	Cathedral City, CA 92234
Gilstrap	Ms. Linda R.			P.O. Box 537	Cathedral City, CA 92264
Giorvac	Jim & June			PO Box 125	Desert Center, CA 92239
Giorvas	Jim & June			Land Yacht Harbor #102	Desert Center, CA 92239
Glenn	Mr. & Mrs. Ed			38-071 Crocus Lane	Palm Desert, CA 92660
Gneri	Ms. Rowena			206 Sunnslope Avenue	Petaluma, CA 94952
Godsey	Annie			PO Box 595	Desert Center, CA 92239
Godsey	Larry & Mayrose			PO Box 646	Desert Center, CA 92239
Goretz	Mr. Benjamin			104 Sarona Circle	Palm Desert, CA 92260
Goza	Ms. Elizabeth S.			P.O. Box 713	Yucca Valley, CA 92286

Lname	Name	Name2	Name3	Street	Citystzip
Graf	Mr. Chris			51-965 Ave Mendoza	La Quinta, CA 92253
Gratham	Mr. Mike			1129 Juniper Drive	Morongo Valley, CA 92256
Gray	Duane			1851 Glenwood	El Centro, CA 92243
Great	Great Basin Foundation	Attn: Clark W. Brott, Director		P.O. Box 880	Jamul, CA 95814
Green	Eric & Hazel			PO Box 112	Desert Center, CA 92239
Green	Matt & Cynthia			PO Box 305	Desert Center, CA 92239-0305
Green	Mr. John			72-564 Edgehill, Apt 3	Palm Desert, CA 92260
Green	Walter & Naryel			PO Box 306	Desert Center, CA 92239
Greene	Mrs. Bobbie			29-800 Ave La Vesta	Cathedral City, CA 92234
Greer	Milt & Lee			9700 Upper Valley Rd	Auburn, CA 95602-9264
Griffin	Mr. & Mrs. Fred Griffin			17840 Rivera Drive	Blythe, CA 92226
Griffith	Don & Noemi			43981 Shadow Way	Desert Center, CA 92239
Grinde	Ms. Claire A.			55-117 Inverness	La Quinta, CA 92253
Gustafson	Joe Bill			PO Box 107	Desert Center, CA 92239
Guy	Don & Marge			PO Box 1296	Rancho Mirage, CA 92270
Haedtke	Donn & Kathy			PO Box 107	Desert Center, CA 92239
Hahn	Kraig			P.O. Box 2941	Capistrano Beach, CA 92624
Hahn	Ms. Helen			215 LaVerne Way	Palm Springs, CA 92264
Hallowell	Kimberly Perry			1617 Forrest Knoll	Ridgecrest, CA 93555
Hamby	Coy & Pauline			PO Box 146	Desert Center, CA 92239
Hamby	Jimmy & Connie			PO Box 145	Desert Center, CA 92239
Hammontree	Mr. James W.			72-406 Sunnyvale Drive	Twentynine Palms, CA 92277
Hanaver	Ms. Roberta			75-710 Altamira	Indian Wells, CA 92210
Hancock	Ms. Theresa N.			76-804 Castle Court	Palm Desert, CA 92260
Harley	Anita			937 Verbena	Desert Center, CA 92239
Harlow	Janet			P.O. Box 401	Desert Center, CA 92239
Harman	Jane	U.S. Member, House of Representatives		5200 W. Century Blvd., #960	Los Angeles, CA 90045
Harrison	Edwin S.			3578 Hacienda Road	Cottonwood, CA 96022
Hart	Ms. Kim			490 Via Ensenada Circle	Palm Springs, CA 92264
Harte	Dorothy			P.O. Box 2628	Palm Springs, CA 92263
Haywood	Mr. E.			438 Sandelwood	Calimesa, CA 92320
Herger	Wally	U.S. Member, House of Representatives		55 Independance Circle, St.104	Chico, CA 95926
Herman	Mr. & Mrs. Gary			76-519 Sweet Pea Way	Palm Desert, CA 92260
Hernandez	Mr. Elliot V.			53-680 Ave Cortez	La Quinta, CA 92253
Herold	Mr. Bill			830 Cleveland Road	Glendale, CA 91202
Herrera	John & Brix			PO Box 524	Desert Center, CA 92239
Herrera	Mildred			44291 Shasta Drive	Desert Center, CA 92239
Herschleb	Mr. Sydney & Frederick J.			74-291 Gary Avenue	Palm Desert, CA 92260
Hessling	Don & Audrey			44141 Shadow Way	Desert Center, CA 92239
Hilton	Mr. Richard			68-055 Club Circle Drive	Desert Hot Springs, CA 92240
Hinderlich	Mrs. Margaret M.			16-220 Janine Drive	Whittier, CA 90603
Hobbs	Wade	Federal Highway Administration		P.O. Box 1915	Sacramento, CA 95812-1915
Hockenberry	Mr. R. J.			2583 N. Palm Canyon Drive	Palm Springs, CA 92262

Lname	Name	Name2	Name3	Street	Citystzip
Holland	Ms. Tanya			525 Avenida Cerca	Palm Springs, CA 92262
Holmes	Dick An Doris			43551 Ragsdale	Desert Center, CA 92239
Hoover	Frank			1822 Miramar St.	Pomona, CA 91767
Hopkins	Walter & Verda			P.O. Box 247	Desert Center, CA 92239-0247
Hopper	Brittney			11550 E. Palm Canyon, #76	Palm Springs, CA 92264
Horn	Steve	U.S. Member, House of Representatives		4010 Watson Plaza Dr., Ste.160	Lakewood, CA 90712
Hornberg	Ken & Louise			PO Drawer 219	Desert Center, CA 92239
Hornick	Ms. Deborah			40281 Sagewood	Palm Desert, CA 92260
Horning	Mr. James L.			44-250 Shasta Drive	Desert Center, CA 92239
Hoskin	Laurene			277 Ave Andorra	Cathedral City, CA 92234
Hoskin	Mr. & Mrs. Ron			624 Ocotillo	Palm Springs, CA 92262
Hosowitz	Joseph L.			70-785 Ironwood Drive	Rancho Mirage, CA 92270
Hot Springs	City of Desert			65950 Pierson Blvd	Desert Hot Springs, Ca 92240
Howard	Don & Beverly			PO Box 69	Crescent Hills, CA 95934
Howarth	Ms. Delores L.			250 Calle Del Verano	Palm Desert, CA 92260
Hoyt	Mr. & Mrs. Peter			76-630 Begonia Lane	Palm Desert, CA 92260
Hughes	Mr. Jesse			43-632 Buena Circle	Palm Desert, CA 92260
Hunter	Duncan	U.S. Member, House of Representatives		366 S. Pierce Street	El Cajon, CA 92020
Hunter	Mr. Dennis			4952 Ettman Drive	Mra Loma, CA 91752
Huravitch	James & Sarah			26800 Fairway Drive	Desert Center, Ca 92239
Hussain	Mr. Zahid			77-594 Missouri Drive	Palm Desert, Ca 92260
Imperial	County Board of Supervisors	Imperial County, Chairman	County Administrative Center	940 W. Main St., Rm. 212	El Centro, CA 92243
Imperial	Imperial Planning Dept.			420 South Imperial Ave.	Imperial, CA 92251
Indian	Cabazon Reservation	John A. James, Chairman		84-245 Indio Springs Rd.	Indio, CA 92201
Indian	Christine Walker, Chairperson	Chemehvevi Tribal Council		P.O. Box 1976	Chemehvevi Valley, CA 92363
Indian	Darryl Mike, Chairman	c/o Glenn Calac	Twentynine Palms General Council	1150 E. Palm Canyon Dr., #75	Palm Springs, CA 92262
Indian	Dennis Miller, Chairman	Morongo Tribal Council		11581 Potrero Road	Banning, CA 92220
Indian	Mary Delgado, Chairperson	Torres-Martinez Council		66-725 Martinez Road	Thermal, CA 92274
Indian	Mr. Richard Milanovich	Aqua Caliente Tribal Council		960 East Tahquitz Way #106	Palm Springs, CA 92262
Indian	Native American Heritage Comm			915 Capital Mall, Rm. 288	Sacramento, CA 95814
Indian	Nora Garcia, Chairperson	Fort Mohave Tribal Council		500 Merrim Ave.	Needles, CA 92363
Indian	Twentynine Palms Reservation	c/o Don McKay, Atty		82-634 Hwy 111	Indio, CA 92201
Indian Wells	Mayor Richard Rr. Oliphant			44-950 Eldorado Dr.	Indian Wells, CA 92210
Indio	Indio Planning Dept.			P.O. Drawer 1788	Indio, CA 92201
Industry	City of	Attn: John Ballas		P.O. Box 3366	City of Industry, CA 91744
Irwin	Dollie Irwin			420 N. Morongo	Banning, CA 92220
Jablow	Ms. Grace			1340 Primavera Drive	Palm Springs, CA 92264
Jacobson	Jack & Ruth			Land Yacht Harbor #46	Desert Center, CA 92239
Jacobson	Mr. Jeff L.			DCO 30 LAI	Twentynine Palms, CA 92278
Jacobson	Ms. Marilyn			6 Lake Shore Drive	Rancho Mirage, CA 92270
Jagodzinski	Mr. Dale			38-850 Bel Air Drive	Cathedral City, CA 92234
Jakobsen	Ms. Lisa			1944 Grand Bahama Drive	Palm Springs, CA 92264
James	Deb James			P.O. Box 168	Desert Center, CA 92239
Janios	Ms. Mary			P.O. Box 349	Morongo Valley, CA 92256

Lname	Name	Name2	Name3	Street	Citystzip
Jaramillo	Lloyd & Joyce			P.O. Box 105	Desert Center, CA 92239-0105
Jeffrey	Robert			Kaiser Eagle Mountain,PO Box37	Desert Center, CA 92239
Jenkins	Mr. Steve			47-395 Monroe Street, #109	Indio, CA 92201
Jenkins	Ms. Carolyn			45-690 Capistrano	Indio, CA 92201
Jenkins	Ms. D. L.			45-707 Deep Canyon Road	Palm Desert, CA 92260
Jent	Mr. & Mrs. Jent			P.O. Box 512	Desert Center, CA 92239
Jent-Pickel	Arnold & Mary			PO Box 512	Desert Center, CA 92239
Jeske	Ken	Public Works	City of Fontana	8353 Sierra	Fontana, CA 92335
Jessie, Jr.	Mr. Tyree			72-673 Raven Road, #4	Palm Desert, CA 92260
Johnson	Carl			7562 Regency Dr.	Palm Springs, CA 92264
Johnson	Duane & Carol			P.O. Box 99	Desert Center, CA 92239
Johnson	James & Pearl			PO Box 633	Applegate, CA 95703
Johnson	Jim & Pearl			Land Yacht Harbor #69	Desert Center, CA 92239
Johnson	Mrs. Dorothy D.			43-660 Skyward Way	La Quinta, CA 92253
Johnson	Ms. Edie			P.O. box 583	Weimar, CA 95736
Johnson	Ms. Sara A.			54-325 Ave Obregon	La Quinta, CA 92253
Johnson	Steve	The Nature Conservancy		785 Market St., 3rd Floor	San Francisco, CA 94103
Jones	Clyde & Joyce			PO Box 365	Desert Center, CA 92239
Jones	Milton			303 N. Indian Ave.	Palm Springs, CA 92262
Jones	Mr. & Mrs. Howard R.			P.O. Box 173	Thousand Palms, CA 92276
Jones	Mrs. H. Lynn			68-265 Santelino	Cathedral City, CA 92234
Jones	Steve			P.O. Box 246	Desert Center, CA 92239
Jones	Steve & Vickie			PO Box 246	Desert Center, CA 92239
Jordan	Richard			32-775 Flagstaff Ave.	Thousand Palms, CA 92276
Kahler	Ms. Rhonda			72-765 Beavertail Street	Palm Desert, CA 92260
Kaplan	Mr. & Mrs. Howard			38-649 Palm Valley Drive	Palm Desert, CA 92660
Kaplan	Ms. Jeanette			72-460 Rodeo Way	Rancho Mirage, CA 92270
Karcher	Ms. Dorothy			38396 Crocus	Palm Desert, CA 92260
Karen	Inman			PO Box 172	Desert Center, CA 92239
Kastor	Ms. Jean D.			38-608 Wisteria Drive	Palm Desert, CA 92234
Kazmaia	Renay			152 Gilley Street	March AFB, CA 92518
Kearn	Mr. & Mrs. Steve			PO Box 347	Desert Center, CA 92239
Kearns	Patricia J. Snyder & Daniel			74621 Leslie Avenue	Palm Desert, CA 92260
Keele	Craig & Larene			PO Box 255	Desert Center, CA 92239
Keller	Richard M.			53-065 Avenida Navarro	La Quinta, CA 92253
Kelley	Kim			914 Oak Street	Lafayette, CA 94549
Kennady	C.			P.O. Box 282	Desert Center, CA 92239
Kennedy	Betty			2729 La Gran Via	Carlsbad, CA 92009
Kennedy	Jo			12618 3rd St.	Desert Center, CA 92239
Kessler	Dallas			P.O. Box 155	Desert Center, CA 92239
Ketel	Ed & Bev			Land Yacht Harbor #72	Desert Center, CA 92239
Khalsa	Gurumartra S.	(RUSD)		4108 Watkins Dr.	Riverside, CA 92507
Kim	Jay	U.S. Member, House of Representatives		1131 W. 6th Street, Suite 160A	Ontario, CA 91762
Kingery	Ralph	Dames & Moore		9665 Chesapeake Dr., Ste. 360	San Diego, CA 92123
Kirby	Claude			PO Box 518	La Quinta, CA 92253
Kirby	Virgil & Karen			PO Box 220	Desert Center, CA 92339-0220

Lname	Name	Name2	Name3	Street	Citystzip
Kishineff	Mr. S.			76-741 Chrysantheum Way	Palm Desert, CA 92660
Kitakis	Mr. John			77-777 Country Club Drive	Palm Desert, CA 92260
Kite	Ms. Kristy			71-205 Thunderbird Terrace N.	Rancho Mirage, CA 92270
Klecker	Don & Elsie			Land Yacht Harbor #65	Desert Center, CA 92339
Klingler	Cole			Land Yacht Harbor #92	Desert Center, CA 92239
Klingler	Darwin & Joann			1107 Cottonwood	Desert Center, CA 92239
Kloepfer	Ben & Arlene			PO Box 7001	Desert Center, CA 92239
Knight	Gene & Sharon			1107 Cottonwood	Desert Center, CA 92239
Krajczynski	Mrs. Dorothy			1 Beaver Tail Lane	Palm Desert, Ca 92226
Kubik	Ms. Paula			P.O. Box 1104	La Quinta, CA 92253
LIB	Calif State Library	Governmental Publications		P.O. Box 942837	Sacramento, CA 94237
LIB	Coachella Branch Library			1538 7th St.	Coachella, CA 92236
LIB	Desert Hot Springs Public Lib			11691 West Dr.	Desert Hot Springs, CA 9224
LIB	Indio Branch Library			200 Civic Center Mall	Indio, CA 92201
LIB	Lake Tamarisk Br Public Lib			43880 Lake Tamarisk Dr.	Desert Center, CA 92239
LIB	Los Angeles Public Library	Documents Dept		433 Spring St.	Los Angeles, CA 90013
LIB	Palm Desert Public Library			45480 Portola	Palm Desert, CA 92260
LIB	Palm Springs Library Center			300 S. Sunrise Way	Palm Springs, CA 92262
LIB	Palo Verde Valley Dist Library			125 W. Chanslor Way	Blythe, CA 92225
LIB	Riverside Central Library	Governments Documents Sec.		3581 Seventh St.	Riverside, CA 92501
LIB	San Bernardino Co Library	Joshua Tree Branch		6465 Park Blvd.	Joshua Tree, CA 92252
LIB	San Bernardino Co Library	Yucca Valley Branch		57098 Twentynine Palms Hwy	Yucca Valley, CA 92284
LIB	San Bernardino Co Library	Yucca Valley Branch		6078 Adobe Rd.	Yucca Valley, CA 92284
LIB	San Bernardino Public Library	Feldheym Central Library		555 W. 6th St.	San Bernardino, CA 92410
LIB	UC Riverside Library	Government Publications		P.O. Box 5900	Riverside, CA 92517
Lake	Ms. Lucy C.			38-633 Wisteria Drive	Palm Desert, CA 92260
Lake Tamarisk	County Service Area #51	Lake Tamarisk Advisory Board		26251 Parkway Drive	Desert Center, CA 92239
Lamon	Cliff & Vivian Lamon			P.O. Box 61	Desert Center, CA 92239
Land	Michelle			2421 N. Driftwood	Rialto, CA 92376
Land Mngmt Dept.	San Bernardino County				
Landfill	Eagle Mountain	Opposition Coalition (EMLOC)		Post Office Box 2000	Indio, CA 92202
Landgreen	Myron & Gouldie			PO Box 443	Desert Center, CA 92239
Lane	Mr. & Mrs. James V.			43-155 Portola Avenue, #83	Palm Desert, CA 92260
Lane	Ms. Mary C.			73450-151 Country Club Drive	Palm Desert, CA 92260
Lanham	David			3719 Washington St.	Riverside, CA 92502
Lantos	Tom	U.S. Member, House of Representatives		400 El Camino Real, Room 820	San Mateo, CA 94402-1797
Larson	Mr. & Mrs. Cliff			P.O. Box 61	Desert Center, CA 92239
Larstead	Florence			425 Sylvan Ave	Banning, CA 92220
Larstead	Sgt. Thom			P.O. Box 423	Desert Center, CA 92239
Latting	Dr. June			320 Maravilla Dr.	Riverside, CA 92507
Lavender	John			P.O. Box 3876	Palm Desert, CA 92260
Lawman	Mr. Robert C.			73-816 De Anza	Palm Desert, CA 92260
Lazansky	Laurie & David			39-239 Regency Way	Palm Desert, CA 92260
LeDuc	Mr. & Mrs. Richard G.			838 Sapphire Street	San Diego, CA 92109
LeWinn	Mr. L. R.			71-170 Patricia Park Place	Rancho Mirage, CA 92270
Lee	Paula	Los Angeles Dept. of Water &		111 N. Hope St., Room 1121	Los Angeles, CA 90012

Lname	Name	Name2	Name3	Street	Citystzip
		Power			
Lemon	Connie			PO Box 234	Desert Center, CA 92239
Lessin	Irvine L.			1080 S. Farrell	Palm Springs, CA 92264
Lessin	Mrs. Frances G.			1080 S. Farrell Drive	Palm Springs, CA 92264-8641
Levin	Mrs. Marion			P. O. Box 390	Rancho Mirage, CA 92270
Lewis	Jerry	U.S. Member, House of Representatives	Attn: Marilyn Glick	1826 Orange Tree Lane, Ste 104	Redlands, CA 92374
Lewis	Ms. Mary E.			1527 10th Street	Santa Monica, CA 90401
Lied	Mr. Milton B.			P.O. Box 3686	Palm Desert, CA 92261-3686
Lilly	Mrs. Martha M.			65 Don Quixote	Rancho Mirage, CA 92270
Linsk	Ms. Nelda			443 Merito Place	Palm Springs, CA 92262
Liu	David			26301 Rice Road	Desert Center, CA 92239
Livengood	Ms. Marian R.			P.O. Box 327	Desert Center, CA 92239
Living	Living Desert Reserve			47-900 Portola Ave.	Palm Desert, CA 92260
Lloyd	John & Susan			PO Box 677	Desert Center, CA 92239
LoKoen	Ms. Rowena L.			52-230 Avenida Villa	La Quinta, CA 92253
Lockhart	Betty & William			39-114 Desert Greens Drive, E.	Palm Desert, CA 92260
Lockhart	Dean			P.O. Box 468	Desert Center, CA 92239
Lockhart	Richard & Rowe			43550 Ragsdale Road #37	Desert Center, CA 92239
Lofgren	Zoe	U.S. Member, House of Representatives		635 N. First Street, Ste. B	San Jose, CA 95112
Loma Linda	City of	Attn: Dan Smith		25541 Barton Road	Loma Linda, CA 92354
Loma Linda	Loma Linda Community Dev.			11140 Anderson St.	Loma Linda, CA 92354
Lombardi	Ms. Carol			3086 Jan Circle	Palm Springs, CA 92262
Lopez	Mr. Javier H.			1515 Sixth Street	Coachella, CA 92236
Lopez	Ms. Joann			13-101 West Drive	Desert Hot Springs, CA 92240
Lopez	Ms. Lorraine M.			100 S. Sunrise Way, Suite 479	Palm Springs, CA 92262
Lorey	Ms. Carilee M.			51-125 Eisenhower Drive	La Quinta, CA 92253
Lorren	Ms. Rosanne M.			38-612 Gladiolus Lane	Palm Desert, CA 92260
Los Alamitos	Los Alamitos Community Dev.			3191 Katella Ave.	Los Alamitos, CA 90720
Los Angeles	L.A. County Reg. Planning Dept.	Attn: Leonard Garoupa	Planning Director	135 West Yosemite Ave.	Madera, CA 93637
Los Angeles	L.A. Dept. of Water & Power	Attn: Paula Lee		111 N. Hope St., Rm. 1121	Los Angeles, CA 90012
Los Angeles	Los Angeles Planning Dept.			200 North Spring St., Rm. 561	Los Angeles, CA 90012
Lovegren	Ms. Gertrude E.			360 Monte Vista Drive	Palm Springs, CA 92262-7320
Loveton	Mr. & Mrs. John			76-241 Poppy Lane	Palm Desert, CA
Lowe	Art Lowe	Eagle Mountain Energy Co	Four Embarcadero Center	Suite 1400	San Francisco, CA 94111
Lua	Ms. Lorena			P.O. Box 772	Mecca, CA 92254
Lucas	Ms. Rosa Sue			74-351 Santolina Drive	Palm Desert, CA 92260
Lynch	Olen & kay			Land Yacht Harbor #34	Desert Center, CA 92239
MWD	Metropolitian Water Dist.	Kathy Kunysz, Environ. Branch		P.O. Box 54153	Los Angeles, CA 90054
Mabon Jr.	Mr. Herbert L.			2950 N. Indian Canyon, #116	Palm Springs, CA 92262
Mackay	Shirley			PO Box 325	Desert Center, CA 92239
Maguire	Tom			72-600 Fred Waring #1606	Palm Desert, CA 92260
Mahoney	Mr. Pat			4441 Mockingbird Lane	Banning, CA 92270
Mandel	Ms. Bess			34-807 Calle Trujillo Ave.	Cathedral City, CA 92234
Mann	Mr. Robert			610 S. Camino Real, #a	Palm Springs, CA 92262
Manuell	Ms. Deborah			76-273 Fairway Drive	Indian Wells, CA 92210

Lname	Name	Name2	Name3	Street	Citystzip
Mapula	Ms. Susan L.			120 Garner Valley	Mountain Center, CA 92561
Marcks	Ms. Deborah			3969 Mahailla Avenue, #112	San Diego, CA 92122
Marguire	Mr. Tom			72-600 Fred Waring Drive,#1606	Palm Desert, CA 92260
Marine	Installations Division, NREA			Marine Corps Air Base	Twentynine Palms, CA 92278
Markman	Mr. & Mrs. Robert			75-396 Stardust Lane	Indian Wells, CA 92210
Marlow	Dave			Route 2, Box 296	Blythe, CA 92225
Marrs	Bill			PO Box 141	Desert Center, CA 92239
Marsh	Mr. Jack			38-47 Crocus	Palm Desert, CA 92260
Marsh	Ms. Sharlyn			36-688 Nasturtrium Way	Palm Desert, CA 92660
Martin	Ms. Kay D.			75-540 Vista Del ray	Indian Wells, CA 92210
Martin	Wayne			932 Verbena	Desert Center, CA 92239
Martinez	Matthew	U.S. Member, House of Representatives	Attn: Warren Schmuki	320 S. Garfield Ave. Ste. 214	Alhambra, CA 91801
Mata	Ms. Catherine			83-481 Emerald Street	Indio, CA 92201
Matsui	Robert	U.S. Member, House of Representatives		8058 Fed Bldg. 650 Capitol Mal	Sacramento, CA 95814
Maybury	Mr. John			160 San Jose Avenue	Pacifica, CA 94044
Mayer	Mr. Steve			80-000 Ave 48, #221	Indio, CA 92201
Mayor	Office of the Mayor	City Hall		11711 West Dr.	Desert Hot Springs, CA 9224
Mayor	Office of the Mayor	City Hall		1515 Sixth St.	Coachella, CA 92236
Mayor	Office of the Mayor	City Hall		3200 E. Tahquitz McCallum Way	Palm Springs, CA 92262
Mayor	Office of the Mayor	City Hall		392 N. 10th St.	Blythe, CA 92225
Mayor	Office of the Mayor	City Hall		68625 Perez Road	Cathederal City, CA 92234
Mayor	Office of the Mayor	City Hall		69-825 Highway 111	Rancho Mirage, CA 92270
Mayor	Office of the Mayor	City Hall		73510 Fred Waring Dr.	Palm Desert, CA 92260
McBride	Mr. Gerald B.			19-490 Tonto Road	Apple Valley, CA 92307
McCanthey	Ms. Jeannine			72592 Edgehill, #2	Palm Desert, CA 92260
McColm	Patricia N. & Rhett W.			5300 Waverly Drive, I-10	Palm Springs, CA 92264
McDonell	F. S. & Eileen			44-299 Dakota Trail	Palm Desert, CA 92260
McDowell	Rylie & Nancy			PO Box 7103	Desert Center, CA 92239
McGarvin	Ms. Melissa A.			505 S. Farrell, #B12	Palm Springs, CA 92264
McGaughran	Ms. Darcie			68-380 Bahada Road	Cathedral City, CA 92234
McGuire	Tom & Liz			PO Box 107	Desert Center, CA 92239
McIntyre	J. M.			P.O. Drawer AR	Blythe, CA 92226
McKay	Wendy W.			45-540 Apache Road	Indian Wells, CA 92210
McKee	Brandon			6040 Windemere Way	Riverside, CA 92506
McKeon	Howard	U.S. Member, House of Representatives		18960 Soledad Canyon Road	Santa Clarita, CA 91351
McMahon	Ed & Diane			44245 Camino Azul	La Quinta, CA 92253
McMichael	Ina			P.O. Box 505	Desert Center, CA 92239
McMurray	Mr. John			74-940 Hwy 111	Indian Wells, CA 92210
McReynolds	Ms. Alice B.			73-373 Country Club Drive	Palm Desert, CA 92260
Mcbride	Mr. & Mrs. Darrell			PO Box 347	Desert Center, CA 92239
Meagher & Flom	Skadden, Arps, Slate,			Four Embarcadero Center	San Francisco, CA 94111-4144
Means	Phillip			PO Box 107	Desert Center, CA 92239
Medina	Ms. Laine			P. O. Box 2761	Palm Desert, CA 92261
Mejia	Lizabeth			1144 Gayland Avenue	Hacienda Heights, CA 91745

Lname	Name	Name2	Name3	Street	Citystzip
Meseck	Mr. Herbert			57-622 Sierra Way	Yucca Valley, CA 92284
Meseck	Mr. Robert M.			4047 Heatherwood Hollow	Moorpark, CA 93021
Meyerhoff	Ms. Natalie & Elizabeth			342 Via Sol	Palm Springs, CA 92262
Michaels	Mr. Al			72-526 Desert Flower	Palm Desert, CA 92260
Mildred	Tong			1057 Whitman	Claremont, CA 91711
Miller	Bill			P.O. Box 445	Desert Center, CA 92239
Miller	Carol			11407 Fredson Street	Santa Fe Springs, CA 90670
Miller	George	U.S. Member, House of Representatives		367 Civic Drive, #14	Pleasant Hill, CA 94523
Miller	Mrs. Dorothy A.			P.O. Box 1127	Palm Desert, CA 92261
Miller	Ms. Joni			P. O. Box 469	Rancho Mirage, CA 92270
Miller	William & Katharina			PO Box 445	Desert Center, CA 92239
Milligan	Ray & Bernice			PO Box 301	Desert Center, CA 92239
Mineta	Norman	U.S. Member, House of Representatives		1245 Winchester Blvd. Ste. 310	San Jose, CA 95128
Mission Springs	Mission Springs Water District			66-575 E. Second St.	Desert Hot Springs, CA 9224
Moltz	Mr. & Mrs.			P.O. Box 107	Desert Center, CA 92239
Montoya	Daniel & Julie			4351 Ragsdale Rd	Desert Center, CA 92239
Moody	Mr.			P.O. Box 107	Desert Center, CA 92239
Moody	Ms. Mary			1440 Driftwood Drive	Palm Springs, CA 92262
Moon	Don			PO Box 74	Desert Center, CA 92239-0074
Moon	Ms. Erika			74-200 Erin Street	Palm Desert, CA 92262
Moore	Ms. Heidi	Eco-Watch/Sonoma		300 Ryan Ranch Road	Sebastopol, CA 95472
Moore	Ms. Linda Greve			46 Karen Lane	Palm Springs, CA 92262
Moorhead	Carlos	U.S. Member, House of Representatives	Attn: Robert Cochrane	420 North Brand Blvd., Rm 304	Glendale, CA 91203
Moorman	Ms. Evelyn			4444 Sunny Dunes, #1	Palm Springs, CA 92264
Morgan	A. L.			P.O. Box 462	Blythe, CA 92226
Morongo	Morongo Basin Conserv Assn			P.O. Box 218	Twentynine Palms, CA 92277
Morrison	Cliff & Alice			Land Yacht Harbor	Desert Center, CA 92239
Morse	Mr. Todd			46-896 Jefferson St., #68	Indio, CA 92201
Muller	Ms. Janet E.			43-160 Texas Avenue	Palm Desert, CA 92260
Murdica	Ms. Connie E.			68-090 Calle Blanco	Desert Hot Springs, CA 92240
Murdica	Ms. Tami L.			68-150 Lousian Street	Desert Hot Springs, CA 92240
Murphy	David & Ruth			PO Box 107	Desert Center, CA 92239
Myer	Greg			P.O. Box 421	Desert Center, CA 92239
Nagel	Ms. Melissa			72-534 Edgehill Drive, #3	Palm Desert, CA 92260
Nash	Don & Melissa			PO Box 107	Desert Center, CA 92239
Navarro	Rosalie & David			2899 San Juan Road	Palm Springs, CA 92262
Nazzaro	Ms. Mary Ann			68-383 Moonlight Drive	Cathedral City, CA 92234
Negortti	Mr. Glenn			73-230 Virginia	Palm Desert, CA 92260
Nelson	Ms. Michelle			12-605 Redbud Road	Desert Hot Springs, CA 92240
Nelson	Wilfred & Donna			PO Box 310	Lake Hughes, CA 93532
New	Mr. & Mrs. Robert L.			71-715 Tunis Road	Rancho Mirage, CA 92270
New	Shea & Larry			71-715 Tunis Road	Rancho Mirage, CA 92270
Nichols	Peter			PO Box 106	Desert Center, CA 92239
Nicolai	Nancy			3983 Idaho St.	San Diego, CA 92104

Lname	Name	Name2	Name3	Street	Citystzip
Nies	Geraldine			PO Box 324	Desert Center, CA 92239
Noland	Ms. D. Theresa			68-383 Moonlight Drive	Cathedral City, CA 92234
Non	Ramer			1134 Country Valley	West Lake, CA 91362
Nusbaum	Mr. Jerry			56 Wagon Jack Lane	Arcata, CA 95521
O'Bryan	Anita			3606 Bandinz Ave	Riverside, CA 92508
Ocadiz	Mr. Frank J.			68-132 Valley Vista Drive	Cathedral City, CA 92234
Ogburn	Gary & Rena			PO Box 7023	Desert Center, CA 92239
Ogburn	Valton & Dorothy			PO Box 368	Desert Center, CA 92239
Ollivier	Gary & Ann			26500 Catalina	Desert Center, CA 92239
Ontario	Ontario Planning Dept.			303 East B St.	Ontario, CA 91764
Open Resources	Open Resources Committee	Attn: Earl Shade		4465 9th St.	Riversice, CA 92501
Operating Engineers	International Union of		P.O. Box 7109	150 East Corson Street	Pasadena, CA 91109-7209
Orange	City of	Attn: Brent Hunter		80 Plaza Square	Orange, CA 92666
Ordaz	Francisco & Maria			PO Box 482	Desert Center, CA 92239
Ostrow	Ms. Cookie			123 Blue River Drive	Palm Desert, CA 92260
Overman	Richard & Karen			PO Box 338	Desert Center, CA 92239
Overson	Eric			PO Box 432	Desert Center, CA 92239
Overson	Eugene & Jeanine			PO Box 383	Desert Center, CA 92239
POL	Hon. Anthony C. Beilenson (D-23)	U.S. Member, House of Representatives	Attn: Diane Brown	11000 Wilshire Blvd., #12230	Los Angeles, CA 90024
POL	Hon. Carlos J. Moorhead (R-22)	U.S. Member, House of Representatives	Attn: Robert Cochrane	420 N. Brand Blvd. #304	Glendale, CA 91203
POL	Hon. Christopher Cox (R-40)	U.S. Member, House of Representatives	Attn: Jim Fournier	4000 Mac Arthur Blvd. E #430	Newport Beach, CA 92660
POL	Hon. Dana Rohrabacher (R-42)	U.S. Member, House of Representatives	Attn: Kathleen Hollingsworth	4332 Cerritos Ave. #100	Los Alamitos, CA 90720
POL	Hon. David Dreier (R-33)	U.S. Member, House of Representatives	Attn: Mark Harmsen	112 N. Second Ave.	Covina, CA 91723
POL	Hon. Edward R. Roybal (D-25)	U.S. Member, House of Representatives	Attn: Henry Lozano	300 N. Los Angeles #7106	Los Angeles, CA 90012
POL	Hon. Elton Gallegly (R-21)	U.S. Member, House of Representatives	Attn: Paula Scheil	200 N. Westlake Blvd. #207	Thousand Oaks, CA 91362
POL	Hon. Esteban Edward Torres, D-34	U.S. Member, House of Representatives	Attn: Laticia Hernandez	8819 Whittier Blvd. #101	Pico Rivera, CA 90660
POL	Hon. George E. Brown, Jr. (D-36)	U.S. Member, House of Representatives	Attn: Wilmer Carter	3600 Lime St., #116	Riverside, CA 92501
POL	Hon. Henry A. Waxman (D-24)	U.S. Member, House of Representatives	Attn: Howard Elinson	8425 W. Third St. #400	Los Angeles, CA 90048
POL	Hon. Howard L. Berman (D-26)	U.S. Member, House of Representatives	Attn: Fausto Capobianca	14600 Roscoe Blvd. #506	Panorama City, CA 91402
POL	Hon. Julian C. Dixon (D-28)	U.S. Member, House of Representatives	Attn: Patricia Miller	5100 W. Goldleaf Cir #208	Los Angeles, CA 90056
POL	Hon. Matthew G. Martinez (D-30)	U.S. Member, House of Representatives	Attn: Warren Schmuki	400 N. Montebello Blvd. #100	Montebello, CA 90640
POL	Hon. Maxine Waters (D-29)	U.S. Member, House of Representatives	Attn: Mike Davis	4509 South Broadway	Los Angeles, CA 90037
POL	Hon. Richard Katz (D-39)	CA State Assembly	Attn: Doug Dowie	9140 Van Nuys Blvd. #109	Panorama City, CA 91402

Lname	Name	Name2	Name3	Street	Citystzip
POL	Hon. Robert K. Dornan (R-38)	U.S. Member, House of Representatives	Attn: Patricia Fanelli	300 Alicante Plaza #360	Garden Grove, CA 92640
POL	Hon. Ron Packard (R-43)	U.S. Member, House of Representatives	Attn: John Weil	2121 Palomar Airport #105	Carlsbad, CA 92009
POL	Honorable Al McCandless (R-37)	Member, U.S. House of Representatives		6529 Riverside Ave., #165	Riverside, CA 92506
POL	Honorable Al McCandless (R-37)	Member, U.S. House of Representatives		74-075 El Paseo	Palm Desert, CA 92261
POL	Honorable Jerry Lewis (R-35)	Member, U.S. House of Representatives	Attn: Marilyn Glick	1826 Orange Tree Lane, #104	Redlands, CA 92374
POL	Honorable John F. Seymour	United States Senator	11111 Santa Monica Blvd.	Suite 915	Los Angeles, CA 90025
POLS	Marguerite Archie-Hudson (D-48)	CA State Assembly	Attn: Karen Earl	8510 S. Broadway	Los Angeles, CA 90003
POLS	Marguerite Archie-Hudson (D-48)	CA State Assembly	Attn: L. Kenneth Brooks	5119 Capitol Bldg.	Sacramento, CA 95814
Packard	Ron	U.S. Member, House of Representatives	Attn: John Weil	221 E. Vista Way, Ste 205	Vista, CA 92084
Pallette	Drew			68045 Montrico	Desert Hot Springs, CA 9224
Palm Desert	City of Palm Desert	Attn: John Wohlmuth		73-510 Fred Waring Dr.	Palm Desert, CA 92260
Palm Desert	Palm Desert City Planning			P.O. Box 1977	Palm Desert, CA 92260
Palm Springs	Palm Springs Planning Div.			P.O. Box 1786	Palm Springs, CA 92262
Palmi	Brian			43551 Ragsdale Rd	Desert Center, CA 92239
Paquin	Mr. Joseph R.			27-185 Scott Road	Sun City, CA 92381
Parcells	Ms. Louise			80-800 Avenue 48, Space #111	Indio, CA 92201
Parker	Mr. Robert			32-420 Shifting Sands Trail	Cathedral City, CA 92234
Parker	Reverend Dean E.			P.O. Box 586	Desert Center, CA 92239
Patterson	Mr. & Mrs.			P.O. Box 254	Desert Center, CA 92239
Paull	Ms. Valerie			624 Ocotillo	Palm Springs, CA 92262
Pelosi	Nancy	U.S. Member, House of Representatives		450 Golden Gate Ave	San Francisco, CA 94102
Perales	Ms. Trina			46-541 Padera Circle	Indio, CA 92201
Perez	Laura A. & Ronald R.			81-027 Pecos Place	Indio, CA 92201
Perez	Mr. & Mrs.			P.O. Box 355	Desert Center, CA 92239
Perezchica	Mr. Jorge			31-569 Ave Lagoviota	Cathedral City, CA 92234
Perris	Perris Planning & Comm. Dev.			101 North D St.	Perris, CA 92370
Perry	Ms. Kitty R.			21 Cornell Drive	Rancho Mirage, CA 92270
Peterson	Gordon			General Delivery	Desert Center, CA 92239
Peterson	Mr. & Mrs. Bob			PO Box 347	Desert Center, CA 92239
Pettis	Mrs. Shirley			18 Churchill Lane	Rancho Mirage, CA 92270
Pills	Mr. & Mrs. J.R.			1161 Joshua Tree Lane	Blythe, CA 92226
Pinson	Dave			P.O. Box 83	Desert Center, CA 92239
Pletz	Marilyn			699 Canon Drive	Palm Springs, CA 92264
Plunkett	Mr. Russell W.			73-450 Country Club Drive	Palm Desert, CA 92260
Pollard	Ms. Kimberly A.			73-471 Buckboard Trail	Palm Springs, CA 92260
Pollard	Susan & William			PO Box 521	Desert Center, CA 92239-0521
Pombo	Richard	U.S. Member, House of Representatives		2321 W. March Lane #205	Stockton, CA 95207
Pomerantz	Mr. Stanley			4 Churchill Lane	Rancho Mirage, CA 92270
Pomona	City of	Attn: Darrell George		P.O. Box 660	Pomona, CA 91769

Lname	Name	Name2	Name3	Street	Citystzip
Porter	Mr. & Mrs. Karl			38-270 Plumsoa Circle	Palm Desert, CA 92260-5039
Powell	Glen & Mary			PO Box 63	Desert Center, CA 92239
Protection Agency	California Environmental			555 Capital Mall, Suite 235	Sacramento, CA 95814
Protection Agency	U.S. Environmental			75 Hawthorne Street	San Francisco, CA 94105-3901
Pticar	Mr. Mario			89-335 Horizon Palms Circle	La Quinta, CA 92253
Public	Public Utilities Commission	Attn: Jack Rich		350 McAllister St.	San Francisco, CA 94102
Public Works	Division of Public Works	Attn: Director		100 Civic Center	Indio, CA 92201
Quimby	Wayne			P.O. Box 201	Desert Center, CA 92239
Quirk	Mr. Ronald			P.O. Box 305	Julian, CA 92036
Ragsdale	Crystal			PO Box 198	Desert Center, CA 92239
Ragsdale	Jeff & Sherry			P.O. Box 166	Desert Center, CA 92239
Ragsdale	Pauline & David			PO Box 66	Desert Center, CA 92239
Ragsdale	Sidney			P.O. Box 431	Desert Center, CA 92239
Ragsdale	Stanley			P.O. Box 257	Desert Center, CA 92239
Rancho Cucamonga	City of	Attn: Bob Zetterberg		10500 Civic Center Dr.	Rancho Cucamonga, CA 91730
Rancho Cucamonga	Rancho Cucamonga Community Dev			9320 Baseline Rd.	Rancho Cucamonga, CA 91730
Rancho Mirage	City of	Attn: Cathy Mitton		69825 Hwy. 111	Rancho Mirage, CA 92270
Randanovich	George	U.S. Member, House of Representatives		2377 West Shaw #105	Fresno, CA 93711
Rash	Mrs. Laura			P.O. Box 1011	Palm Desert, CA 92261
Rasmussen	Ms. Cherlye			81-211 Palmyra	Indio, CA 92201
Ratcliff	Bill			PO Box 284	Desert Center, CA 92239-0284
Rathwell	Harold & Betty			44161 Crystal Way	Desert Center, CA 92239
Ratz	Yvette			18900 Jura Lane	Fiddletown, CA 95629-9700
Rawnsley	Mr. Richard W.			P.O. Box 832	Morongo Valley, CA 92256
Raymond	Ms. Sandra K.			P.O. Box 521	Joshua Tree, CA 92252
Reames	Allen & Maria E.			P.O. Box 471	Desert Center, CA 92239
Redlands	City of	Attn: Ronald Mutter		P.O Box 3005	Redlands, CA 92373
Reed	Clyde			6657 Cathy Place	Riverside, CA 92504
Reed	George			6694 Oakmont Dr	Santa Rosa, CA 95409
Reed	Larry & Kathy			P.O. Box 175	Desert Center, CA 92239
Reed	Mr. George			HCO-2 Box 649	Twentynine Palms, CA 92277
Reeves	Bob			PO Box 107	Desert Center, CA 92239
Reg.	Reg. Water Quality Control #8			6809 Indiana Ave., Ste. 200	Riverside, CA 92506
Reg.	Reg. Water Quality Control #9			9771 Clairmont Mesa Blvd,Ste B	San Diego, CA 92124
Reinhart	Chip & Maria			PO Box 599	Desert Center, CA 92239
Reiss	Richard & Violet			11985 Torrry Pines Drive	Auburn, CA 95603
Reistroffer	R. Reistroffer		26440 Rice Road	P.O. Box 652	Desert Center, CA 92239
Rendulic	Phyllis & John			79-335 Horizon Palms Circle	La Quinta, CA 92253
Renzi	Vance & Carolyn			Land Yacht Harbor #149	Desert Center, CA 92239
Riconosciuto	Ms. Karen M.			81-663 Lido Avenue	Indio, CA 92201
Rider	Don & Ruth			Land Yacht Harbor #131	Desert Center, CA 92239
Riedy	Mr. Norbert	The Wilderness Society		116 New Montgomery, Suite 526	San Francisco, CA 94105
Riffle	Ms. Barbara			23 Circle A Drive	Palm Desert, CA 92260
Riggs	Frank	U.S. Member, House of Representatives		1700 2nd Street, Suite 378	Napa Valley, CA 94559
Ritter-Grimm	Ms. Bethanyanne			81-256 Palmwood Drive	Indio, CA 92201

Lname	Name	Name2	Name3	Street	Citystzip
Rivers	Walter			227 Monte Vista	Larkspur, CA 94939
Riverside	City of	Attn: Steve Whyld		3900 Main St.	Riverside, CA 92522
Riverside	Eileen Dalton	Riv Co Economic Community Development		3499 Tenth St.	Riverside, CA 92502
Roach	Nathan & Shannon			PO Box 107	Desert Center, CA 92239
Roberts	Jan			PO Box 37	Desert Center, CA 92239
Robles	Ms. Diana A.			74-821 Borrego Drive	Palm Desert, CA 92260
Rodarte	Micky & Nattie			P.O. Box 391	Indio, CA 92202
Rodgers	Mr. Peter			38-452 Plumosa Circle	Palm Desert, CA 92260
Rodney	Ms. Rhea			72-303 Blueridge	Palm Desert, CA 92260
Rodriguez	Max & Lucy			PO Box 518	Desert Center, CA 92239
Rodriguez	Mr. Jeffrey D.			53-520 Avenida Madero	La Quinta, CA 92253
Rodriguez	Ms. Delores			68-595 F. Street	Cathedral City, CA 92234
Rodriguez	Ms. Edith			P.O. Box 713	Thermal, CA 92274
Rogers	Janelle			650-23 South Rancho Sante Fe	San Marcos, CA 92069
Rogers	Keith			1070 Mesquite Ave	Palm Springs, CA 92262
Rohrabacher	Dana	U.S. Member, House of Representatives	Attn: Kathleen Hollingsworth	16162 Beach Blvd. Ste 304	Huntington Beach, CA 92647
Roland	Carl & Regina			PO Box 347	Desert Center, CA 92239
Roman	Mr. Joseph A.			2825 E. Tahquitz Way, Ste D-1	Palm Springs, CA 92262
Roman	Mr. Robert			P. O. Box 2000	Indio, CA 92202
Roman, Chairman	Mr. Dan	Eagle Mountain Landfill	Opposition Coalition (EMLOC)	Post Office Box 2000	Indio, CA 92202
Roman, Jr.	Mr. Robert	V. Chairman, Eagle Mountain Landfill	Opposition Coalition	Post Office Box 2000	Indio, CA 92202
Roman, Jr.	Robert E.			44446 Biskra Street	Indio, CA 92201
Romano	Ms. Eileen			58-073 Hidden Gold	Yucca Valley, CA 92284
Romero	Mr. & Mrs. Walter			57-087 Yucca Trail #1	Yucca Valley, CA 92284
Romero	Ms. Renee			P. O. Box 1592	La Quinta, CA 92253
Root	Jim Root			P.O. Box 233	Desert Center, CA 92239
Rose	Mr. Bozena			P.O. Box 2602	Indio, CA 92202
Rosen	Ms. Marie			39-670 Morongo Canyon	Palm Desert, CA 92260
Rosenfield-Rudin	Mrs. Elaine			47 La Ronda Drive	Rancho Mirage, CA 92270
Ross	Ms. Johanna			P.O. Box 1235	Palm Springs, CA 92263
Roth	Ms. Diane K.			79-151 Starlight Lane	Bermuda Dunes, CA 92201
Rouda	Ms. Dawn V.			45-580 Via Corona	Indian Wells, CA 92210
Rourke	Trigg R.			P.O. Box 7102	Desert Center, CA 92239
Rouse	Glenn Rouse	California Mining Assoc		1010 Eleventh St., #213	Sacramento, CA 95814
Rowe	Albert & Dorothy			P.O. Box 62	Desert Center, CA 92239
Roybal-Allard	Lucille	U.S. Member, House of Representatives		255 E. Temple St. Ste #1860	Los Angeles, CA 90012
Royce	Edward	U.S. Member, House of Representatives		305 N. Harbor Blvd., Ste. 300	Fullerton, CA 92632
Rusche	Margit			Chiriaco Summit	Desert Center, CA 92239
SANBAG	SANBAG	Attn: Wesley McDaniel		444 N. Arrowhead Ave., #101	San Bernardino, CA 92401
SCA	SCA Turtle & Tortoise Club	Attn: Tom Lackey, Pres.		P.O. Box 90252	Los Angeles, CA 90009
SCAG				818 W. 7th St, 12th Floor	Los Angeles, CA 90017-3435
Salisbury	Ms. Clara			74-241 Zircon	Palm Desert, CA 92260

Lname	Name	Name2	Name3	Street	Citystzip
Salmon	Mr. & Mrs. Richard			64-973 Oakmount	Desert Hot Springs, CA 92240
Salz	Ron Salz			P.O. Box 1450	Palm Springs, CA 92263-1450
Samons	Vince & Christine			43-650 Carmel Circle	Palm Desert, CA 92260
San Bernardino	County of San Bernardino	Brian Turnbull, Econ & Comm Develop.		474 W. Fifth St.	San Bernardino, CA 92415
San Bernardino	County of San Bernardino	Sold Waste Mgmt. Dept.	Atn: Asher Hartel, Senior Assoc. Planner	385 N. Arrowhead Ave.	San Bernardino, CA 92415-01
San Bernardino	County of San Bernardino	Solid Waste Management Dept.	Attn: Joe Bellandi, Supervising Planner	621 E. Carnegie Dr., Ste. 270	San Bernardino, CA 92415-00
San Bernardino	San Bernardino City Planning			300 North D St.	San Bernardino, CA 92418
San Bernardino	San Bernardino County Museum			2024 Orange Tree Lane	Redlands, CA 92373
San Bernardino	Sharon Hightower	Director of Planning	County of San Bernardino	385 North Arrowhead Ave.	San Bernardino, CA 92415-01
San Diego	SANDAG	Attn: Kenneth Sulzer	Security Pacific Plaza	1200 Third Ave, Ste. 524	San Diego, CA 92101
San Diego	San Diego County Planning Dept			5201 Ruffin Road	San Diego, CA 92123
Sanchez	Alberto & Irma			44430 Thurman St	Desert Center, CA 92239
Sanders	L. D.	Manager, Edgemont Community Services		P.O. Box 2024	Riverside, CA 92506
Sanford	Chuck			PO Box 211	Desert Center, CA 92239
Sansom	Mrs. Florence			33-035 Guadalajara	Thousand Palms, CA 92276
Sargent	Spencer & Marilyn			4466 Toyon Rd	Riverside, CA 92504
Saute	Ms. Jennifer			78-650 Ave Tujanga	La Quinta, CA 92253
Savage	William			930 Unruh, Apt. 3	La Puente, CA 91744
Scarpinato	A. L.			303 N. Indian Ave.	Palm Springs, CA 92262
Schaefer	Mr. & Mrs. Ron			68-318 Peladora	Cathedral City, CA 92234
Scherba	Dr Jerald	CA Desert Studies		800 N State College Blvd	Fullerton, CA 92634
School District	Desert Sands Unified	Attn: Educational Services		82879 Highway 111	Indio, CA 92201
Schullo	Stephen A.			1955 Via Miraliste, #13/15	Palm Springs, CA 92262
Schultz	Ms. Ruby N.			3576 Bogert Trail	Palm Desert, CA 92264
Scoggin	Dick & Royleen			Land Yacht Harbor #126	Desert Center, CA 92239
Scorsone	Ms. Carol Denise			69-816 Bluegrass Way	Cathedral City, CA 92234
Scott	Mr. & Mrs. Kenneth			76-654 Pansy Lane	Palm Desert, CA 92260
Scott	Mr. John			73-266 Perez, D-9	Cathedral City, CA 92234
Scott	Ms. Suzanne			73-266 Goldflower	Palm Desert, CA 92260
Seastrand	Andrea	U.S. Member, House of Representatives		1526 State Street #206	Santa Barbara, CA 93116
Seder	Mr. & Mrs. Warren J.			76-491 Sweet Pea Way	Palm Desert, CA 92260
Selby	Harvey & Bea			PO Box 217	Desert Center, CA 92239
Semore	Kim			PO Box 162	Desert Center, CA 92239-0162
Semore	Suzan			840 Palo Verde Dr. PO Box 162	Desert Center, CA 92239-0162
Shannon	Myrtle			PO Box 115	Desert Center, CA 92239
Shearer	Mrs. Jo			72-742 Willow, #2	Palm Desert, CA 92260
Sierra Club	Sierra Club - San Gorgonio Chapter	Ann Dennis		568 N. Mountain View, 120	San Bernardino, CA 92401
Sierra Club	Sierra Club Legal Defense Fund	Attn: Deborah Reames		2044 Fillmore St.	San Francisco, CA 94115
Sierra Research		Attn: Gary Rubinstein		1521 I Street	Sacramento, CA 95814
Sikorsi	Ron			45590 Grace St.	Indio, CA 92201
Silvers	Randy			11267 Pegasus Avenue	San Diego, CA 92126

Lname	Name	Name2	Name3	Street	Citystzip
Silvey	Lorraine			26791 Fountain Cove Dr.	Desert Center, CA 92239
Simmons	Ms. Mary			80-380 Ave 43	Indio, CA 92201
Simonsen	Mrs. Betty Lee			38-497 Nasturium Way	Palm Desert, CA 92260
Sims	Darroyl & Margie			PO Box 138	Desert Center, CA 92239
Skarda, C.SS.R.	Brother David			233 Lake Avenue	Saratoga Springs, CA 12866-2
Skates	Paul & Vernessa Skates			30925 Montgomery Ave.	Nuevo, CA 92367
Smiler	Ms. Donna			225 Ave Palmera, #18	Palm Springs, CA 92264
Smiley	Mr. Steven	Citizens for the Chuckwalla Valley		P.O. Box 397	Desert Center, CA 92239
Smith	Mr. & Mrs. Lester			899 Island Drive, #702	Rancho Mirage, CA 92720
Smith	Mr. D. William			48-300 Mariposa Drive	Palm Desert, CA 92260
Smith	Mr. James W.			P.O. Box 1990	Alpine, CA 91903
Smith	Mr. Russell			77-022 California Drive	Palm Desert, CA 92260
Smith	Ms. Marilynn R.			47-316 Via Genoa	Indio, CA 92201
Smith	Patricia M.			899 island Drive #702	Rancho Mirage, CA 92270
Snyder	Mr. Peter			51-860 Hessera	La Quinta, CA 92253
Snyder	Ms. Patricia J.			74-621 Leslie Avenue	Palm Desert, CA 92260
So. Calif	So. Calif. Assoc. of Governments	Attn: Philip Fernando		818 W. 7th St., 11th Flr.	Los Angeles, CA 90017
Soares	Ms. Jolie			77-230 California Drive	Palm Desert, CA 92260
Society	The Wilderness			116 New Montgomery, Suite 526	San Francisco, CA 94105
Solomon	Mr. Peter			76-857 Abby Court	Palm Desert, CA 92260
South Coast	South Coast Air Quality Mgmt. District	Mge Dist., Tech Info Ctr		9150 Flair Dr.	El Monte, CA 91731
Southern	Southern Calif. Edison Co.			25209 San Jacinto St.	Hemet, CA 92343
Southern	Southern California Gas			P.O. Box 2200	Riverside, CA 92506
Southern	Southern Pacific Railroad			610 S. Main St.	Los Angeles, CA 90014
Spandan	Anne R.			47316 Via Genoa	Indio, CA 92201
Spence	Ms. Cindy			2200 Janis	Palm Springs, CA 92262
Spencer	E.O.			151 North Arden	Los Angeles, CA 90004
Stanger	Mr. Rob			432 Sunningdale	Ranch Mirage, CA 92270
Stanley	Vera			P.O. Box 7014	Desert Center, CA 92239
Stark	Fortney	U.S. Member, House of Representatives		22320 Foothill Blvd., Ste 500	Hayward, CA 94541
Starner	Mr. & Mrs. Robert E.			73-202 Foxtail lane	Palm Desert, CA 92260
Stasi	Mr. & Mrs. Al			PO Box 347	Desert Center, CA 92239
Statler	Ken & Mary			PO Box 159	Desert Center, CA 92239
Stewart	Franklin C.A.			25820 Via Jacara Court	Moreno Valley, CA 92553
Stewart	Mr. Thomas E.			76-651 Daffodil	Palm Desert, CA 92660
Stewart	Ms. Tamam A.			70-551 Placerville	Rancho Mirage, CA 92270
Stewart, Ph. D.	Glenn R.	Biol Sci Dept, Cal Poly		3801 W. Temple St.	Pomona, CA 91768
Stisken	Ms. Stella			50 Pine Valley Drive	Rancho Mirage, CA 92270
Stokes	Jerry			P.O. Box 317	Desert Center, CA 92239
Stone	Mr. Gerald			48-123 Via Hermosa	La Quinta, CA 92253
Stone	Ms. Joanne			48-123 Via Hermosa	La Quinta, CA 92253
Strain	James			1920 Underwood Rd.	Holtville, CA 92250
Strang	Ms. Linda J.			810 Rose Avenue	Palm Springs, CA 92262
Stratton	Ms. Patsy			71-701 Cholla Way	Palm Desert, CA 92260

Lname	Name	Name2	Name3	Street	Citystzip
Strebbins	Robert C.			University of California	Berkley, CA 94720
Street	Gerald & Nina			Lake Tamarisk Drive	Desert Center, CA 92239
Stuart	Mr. Franklin C. A.			25-820 Via Jecara Court	Moreno Valley, CA 92553
Sullivan	Mr. Michael J.			54-345 Ave Ramirez	La Quinta, CA 92253
Sullivan	Ms. Kara			74-351 Santolina Drive	Palm Desert, CA 92260
Swan-Draper	Ms. Stacey			74-671 Prospector	Palm Desert, CA 92260
Swap	Edith			43940 Shadow Way	Desert Center, CA 92239
Swerdlow	Ms. Evelyn			90 Santa Anita	Rancho Mirage, CA 92270
Taber	Allan			PO Box 373	Desert Center, CA 92239
Targon	Ms. Mildred			38-338 Crocus lane	Palm Desert, CA 92260
Taylor	Ms. Paula			1488 E. Ramon Road, #243	Palm Springs, CA 92264
Temple	Temple City Planning Dept.			P.O. Box 668	Temple City, CA 91780
Tenold	Mr. Daniel			68-132 Valley Vista	Cathedral City, CA 92234
Tetra	Tetra Tech, Inc.	Attn: Marilyn Beardslee	Senior Planner	348 W. Hospitality Ln, Ste 300	San Bernardino, CA 92408
Thiebaud	Ms. Patricia			47-376 Jadida	Palm Desert, CA 92260
Thomas	William	U.S. Member, House of Representatives		4100 Truxtun Ave. #200	Bakersfield, CA 93309
Thompson	Ms. Jeannine			66-735 12th Street, B5	Desert Hot Springs, CA 92240
Thompson	Ms. Phyllis			76-248 Impations Circle	Palm Desert, CA 92660
Thompson	Ms. Yvonne K.			72-577 Edgehill Drive, #4	Palm Desert, CA 92260
Thorness	Mr. James E.			1863 Park Drive	Palm Springs, CA 92262
Thurston	Tom & Shirley			PO Box 107	Desert Center, CA 92239
Tiffee	John & Shirley			26500 Greenvale Way	Desert Center, CA 92239
Tipton	Mr. Ronald W.			Box 5133, MGACC	Twentynine Palms, CA 92278
Tirpak	Marie			P.O. Box 293	Desert Center, CA 92239
Tisdel	Bob & Gert			PO Box 231	Desert Center, CA 92239
Tisdel	Mr. & Mrs.			P.O. Box 602	Chiriaco Summit, CA 92201
Tisdel	Steve & Freda			PO Box 124	Desert Center, CA 92239
Toenjas	Mr. Morrison R. & Ms. Julianne			1863 Park Drive	Palm Springs, CA 92262
Toomey	Ms. Jane B.			54-995 Shoal Cree	La Quinta, CA 92253
Toria	Ms. Elsie V.			320 S. 4th Street	Blythe, CA 92225
Torres	Esteban	U.S. Member, House of Representatives	Attn: Laticia Hernandez	8819 Whittier Blvd.	Pico Rivera, CA 90660
Torres	Oscar & Ila			PO Box 122	Desert Center, CA 92239
Tounjus	Harrison R.			1863 Park Drive	Palm Springs, CA 92263
Toussaint	Mr. & Mrs. Ronald B.			82-610 Doolittle	Indio, CA 92201
Tramontano	Mr. Paul			P. O. Box 172	Sequoia National Park, CA 93
Transportation	Dept. of	Attn: Environ. Planning		2501 Pullman St.	Santa Ana, CA 92705
Transportation Dept.	Riverside County			P.O. Box 1090	Riverside, CA 92502-1090
Tree Nat'l Mon.	U.S. Dept. of Interior-Joshua	Attn: Pat McClenahan		74485 National Park Dr.	29 Palms, CA 92277
Troup	Ms. Jodie			40-300 Washington Street	Bermuda Dunes, CA 92201
Truax	Betsy			301 Ishica Ave.	Rancho Cucamonga, CA 91730
Truitt	Mickey & Will			44080 Shadow Way	Desert Center, CA 92239-0104
Tucker	Ms. Sylvia B.			72-816 BelAir Road	Palm Desert, CA 92260
Tucker	Walter	U.S. Member, House of Representatives		145 Compton Blvd.	Compton, CA 90220
Turner	Lyle			18583 Alexandra Way Site 73	Grass Valley, CA 95949-7357

Lname	Name	Name2	Name3	Street	Citystzip
Turpen	Brian			PO Box 347	Desert Center, CA 92239
Twentynine Palms	Chamber of Commerce	Twentynine Palms		6136 Adobe Road	Twentynine Palms, CA 92277
UCR	UCR Archaeological Research			900 University	Riverside, CA 92507
UCR	University of California	UCR Life Science Dept.	Attn: W.W. Mayhew	900 University	Riverside, CA 92507
US Army	Jim Myrtetus	Dept. of the Army	LA District, Corps. of Engr.	P.O. Box 2711	Los Angeles, CA 90053-2325
US Atty	James Arnold	Asst U.S. Attorney		312 N. Spring St., Rm. 1165	Los Angeles, CA 90012
US DA	USDA Soil Conservation Service			1200 Arizona, A-7	Redlands, CA 92373
US DOI	Bureau of Reclamation			P.O. Box 427	Boulder City, NV 89005
US DOI	U.S. Dept. of Interior	Bureau of Indain Affairs		3600 Lime St., #722	Riverside, CA 92501
US Fish & Wild	U.S. Fish & Wildlife Service			24000 Avila Ave.	Laguna Niguel, CA 92656
US Forest	Forest Supervisor	San Bernardino National Forest		1824 S. Commercenter Cir.	San Bernardino, CA 92408
Underwood	Jackie Underwood			672 Hewitt	San Jacinto, CA 92383
Utt	Ms. Mary			47-740 Zoila	Indio, Ca 92201
Van Matre	Buster & Audrey			PO Box 487	Desert Center, CA 92239
Vanderholf	Virginia			Chiriaco Summit #1	Indio, CA 92201
Vann	John & Dannia			PO Box 426	Desert Center, CA 92239
Vann	Kim			P.O. Box 317	Desert Center, CA 92239
Velchin	Mrs. Norma			76651 Poppy Lane	Palm Desert, CA 92260
Very	Roland & Dorothy			P.O. Box 736	Desert Center, CA 92239
Vogel	Mr. Adolf W.			796 High Road	Palm Springs, CA 92262
Vreede	Mr. William			48-080 Birdie Way	Palm Desert, CA 92260
Wald	Ms. Johanna H.	Senior Attorney	Natural Resources Defense Council	71 Stevenson Street	San Francisco, CA 94105
Waldren	Ken & Aimee			LYH #8	Desert Center, CA 92239
Walker	Mr. Gary			53-705 Avenida Diaz	La Quinta, CA 92253
Ward	Byron & Norma			Land Yacht Harbor #94	Desert Center, CA 92239
Warner	John R.			P.O. Box 387	N. Palm Springs, CA 92258-03
Warren	Paul & Margaret			PO Box 7303	Desert Center, CA 92239
Waste Mgmt Dept.	San Bernardino Solid	Attn: Steve Wilson		222 W. Hospitality Lane	San Bernardino, CA 92415-001
Waters	Maxine	U.S. Member, House of Representatives	Attn: Mike Davis	10124 South Boardway	Los Angeles, CA 90003
Waxman	Henry	U.S. Member, House of Representatives	Attn: Howard Elinson	8436 W. Third St., Ste 600	Los Angeles, CA 90048
Welchlin	Norma			76651 Poppy Lane	Palm Desert, CA 92260
Welty	Brook			77665 Barons Circle	Palm Desert, CA 92260
Wenner	Mr. & Mrs. Thomas. G.			25 Coble Drive	Cathedral City, CA 92234
Weston	Ms. June T.			32-748 Bloomfield	Thousand Palms, CA 92276
Wetty	Ms. Brooke			77-665 Barons Circle	Palm Desert, Ca 92260
Whalen	Pat			43940 Shadow Way	Desert Center, CA 92239
White	Mr. James D.			39-840 Narcissus Way	Palm Desert, CA 92260
White	Paul & Laura			Land Yacht Harbor #112	Desert Center, CA 92239
Whitehouse	James			6529 Riverside Ave #150	Riverside, CA 92506
Wiener	Mr. Alan			38-398 Zinnia	Palm Desert, CA 92660
Wilderness	Wilderness Society	Attn: Joan Reiss		116 New Montgomery, #526	San Francisco, CA 94105
Wilkin	Joe & Mary Ellen			PO Box 725	Desert Center, CA 92239
Wilkin	Steve & Cindy			PO Box 727	Desert Center, CA 92239

Lname	Name	Name2	Name3	Street	Citystzip
Wilks	Ms. Diana			76-299 Dahlia	Palm Desert, CA 92260
Williams	James & Marilyn			26501 Greenvale Way	Desert Center, CA 92239
Williams	Janet & Roy			Land Yacht Harbor #113	Desert Center, CA 92239
Williams	Marilyn			P.O. Box 353	Desert Center, CA 92239
Williams	William & Pat			PO Box 382	Desert Center, CA 92239-0382
Willsey	Ms. Dawn			32-190 Monte Vista	Cathedral City, CA 92234
Wilson	Lester & Barbara			PO Box 278	Desert Center, CA 92239
Wilson	Mr. & Mrs. Tom			PO Box 347	Desert Center, CA 92239
Wilson	Mr. Jerry			3788 Melrose, #49	Cathedral City, CA 92234
Wilson	Ms. Susan			37 Clancy Lane South	Rancho Mirage, CA 92270
Winner	Mrs. Alan M.			73-163 Somera Road	Palm Desert, CA 92260
Wiseman	Richard & Barbara			Land Yacht Harbor #68	Desert Center, CA 92239
Wolfe	Mr. & Mrs. Gary			38-568 Nasturtium Way	Palm Desert, CA 92260
Wolfman	Ms. Lori B.			78-990 Indian Wood Court	La Quinta, CA 92253
Wood	Barry			13211 Deron Avenue	San Diego, CA 92129
Wood	E.M.	Regional Federal Hwy. Admin.	San Francisco Regional Office	211 Main St., Room 1100	San Francisco, CA 94105
Wood	Terry			P.O. Box 132	Desert Center, CA 92239
Woody	Charles & Marita			PO Box 210	Desert Center, CA 92239
Woolsey	Lynn	U.S. Member, House of Representatives		1050 Northgate Dr., Ste. 140	San Rafael, CA 94903
Wucker	Ms. Carolyn			53-920 Eisenhower Drive	La Quinta, CA 92253
Xepoln	Mr. Anthony			38-011 Clocus Lane	Palm Desert, CA 92260
Zieler	Mary			PO Box 135	Desert Center, CA 92239
d'Entremont	Ms. Aileen			53-815 Herrera	La Quinta, CA 92253

June 26, 1995

Draft Summary of Scoping Comments for

Eagle Mountain Landfill and Recycling Center

Environmental Impact Statement/Environmental Impact Report

This memorandum summarizes preliminary written and oral comments received at the public scoping meetings for the Eagle Mountain Landfill and Recycling Center Project. Four scoping meetings were held over a two-day period (May 31 and June 1, 1995). In addition, separate scoping meetings were held with regulatory agencies and litigants to the original EIS/EIR. This preliminary summary reflects scoping comments received by mid-June, and will be updated following additional meetings and written comments.

Only comments that are relevant in determining the scope of the new EIS/EIR for the Eagle Mountain Landfill and Recycling Center are included below. These comments reflect the various comments of the individuals and regulatory agencies involved in the many scoping sessions. The comments have been categorized under the appropriate topic area.

Aesthetics/Visual

- There may be a potential impairment of visual quality associated with the operation of the landfill. Specific concerns are the potential for visual impacts from: dust clouds, steam plumes, visibility of stacks, wind blown trash, and glare from truck windshields.
- There may be a potential improvement in the visual quality of the area by filling in the mined area of Eagle Mountain with the landfill because it is a better visual sight than the large hole that has been left there by the mining operations.
- Potential light and dust pollution need to be addressed.
- Address effects during different phases of the project, not just closure.

Air Quality

- Is the South Coast Air Quality Management District's (SCAQMD's) and EPA's assessment of the proposed project as a major stationary source rather than being subject to the federal Prevention of Significant Deterioration (PSD) program and the SCAQMD's new source review program appropriate?
- What is the potential for dust and visibility of stacks?
- What is the potential for nitrogen oxide emissions to eventually deposit on vegetation?
- Children at tne elementary school in the town site may be affected from exposure to air-borne pathogens

- Visibility effects in JTNP need to be addressed. Visibility modeling protocols need to be reviewed with NPS.
- Night sky is an air quality related value. Potential mitigation could include directional lighting, shielding, low or high pressure sodium lighting.
- Potential odor effects should be addressed.
- Impacts from the townsite development and traffic should be addressed.
- Emissions change (decrease) from use of the GCL due to less dust should be addressed.
- Emissions due to increased service area should be analyzed.
- Emissions of ECEC project should be considered in the analysis.
- Confirm conformance with SCAQMD regulations.
- Revise and update ambient data for new document.
- Address mitigation monitoring requirements for air issues in revised document.
- BACT should be used for all phases of the project.

Alternatives

- Alternatives need to be addressed in light of need for the proposed project.
- Landfill mining has been used successfully in other parts of the country to develop additional capacity and provide a source of revenue. It should be examined as an alternative.
- Is aqueduct water a viable alternative water source for the Eagle Crest Energy project?
- What alternative sites will be addressed in the EIS/EIR?
- Will impacts of MRF's and transfer stations required to be in place for the project be addressed?
- In-basin and out-of-basin sites need to be addressed.
- The public should be informed of waste management alternatives to landfills.

Biological Resources

Desert Tortoise:

- Desert tortoise populations may be affected by off-road vehicles, military maneuvers, poaching, and predators (e.g. raven, kit fox, kangaroo rat).
- Introducing trash to the area may result in increased predators species and increased preying on tortoises.
- The increased traffic on roads during construction and operation of the landfill should be taken into consideration in light of desert tortoises crossing the roads. Fencing along the roads as a mitigation measure is effective, but the research on this issue is ongoing.
- Burrowing plays an important role in soil dynamics in the desert by turning over desert soil, which could have a significant ripple effect on the upper desert soil layer (e.g., dispersing seeds).
- What about the desert tortoise population in the vicinity of the park?
- What is the methodology for surveying the desert tortoise?

- JTNP should be the control site that all other area's tortoise populations should be measured against.
- Evidence suggests grazing has not significantly impacted desert tortoise populations; need to review literature.
- The combined impacts of train and truck traffic on breeding should be addressed.

Other Wildlife/Vegetation

- The suspected increase in water use of the Eagle Mountain landfill project and/or any other proposed project (e.g. Eagle Crest Energy project) may have adverse effects on Bighorn sheep populations and vegetation in the area.
- There is the potential for the introduction of exotic plants as a result of the anticipated increase in water use. Exotic plants could result in increased fires in the future.
- The EIS/EIR should address the fire potential of this and other potential causes, such as sparks from engines.
- How will the BLM address Fish and Wildlife Coordination Act issues?

Cumulative Impacts

- What will be the volume of water required by both the proposed Eagle Mountain landfill and the Eagle Crest Energy Company's proposed hydroelectric project?
- It was suggested that the Eagle Crest hydroelectric project will require 1 trillion gallons for initial filling and will cause groundwater levels to drop by 100 to 150 feet. The EIS/EIR should address the drawdown of the groundwater in the Chuckawalla Basin and how this would affect Pinto Basin (considering both the Eagle Mountain Landfill Project and the Eagle Crest Energy Project).
- The cumulative effects analysis should address potential needs for MRF's and transfer stations, and potential residential development of Desert Center.
- How will the simultaneous development of the two projects (Eagle Mountain Landfill and Eagel Crest Energy Corporation) be addressed?
- What are the cumulative effects on energy use with the ECEC project?
- The cumulative impacts of other land exchange proposals should be considered.
- Cumulative effects on County resources should be analyzed.

Ecosystem Approach

- The previous EIR focused on complying with distinct legal requirements that do not recognize the ecosystem approach needed for JTNP. Specific ecosystem concerns raised were the need to address nutrient cycling, energy flow, biomass production, recycling, microbial ecosystems, and other biodiversity issues.
- Ecosystems have certain common characteristics, i.e., stable over a certain time frame, self-perpetuating, resistant to certain influences. The Ecosystem

Approach requires a highly qualified ecologist with a proven track record to determine what would constitute a demonstration of no harm to the ecosystems of concern.

Groundwater/Surface Water

- Groundwater contamination in the region under and adjacent to the landfill is of concern. Some older landfills in the region have been cited as leaking and polluting the groundwater, and it was suggested that due to the 1 billion cubic yards of earth moved using high density explosives during operation of the mine, many caves, caverns, and holes exist in the area that create potential pathways to groundwater.
- At Ferrum Junction, which the railroad passes, the groundwater table is very close to ground level. If the train were to derail or leak at this point what would be the impact?
- With respect to surface water, there is a canal used for potable water within 800 feet of the landfill property. What impact will landfill operations have on water quality?
- What will potential impacts to other water users such as aquaculture?

Hazardous Waste

- A Materials Recovery Facility (MRF) may be required for Eagle Mountain and should be addressed in the EIS/EIR.
- Where will hazardous waste be stored at the site?
- Are tailing materials to be used at the site potentially hazardous?
- Are tailings considered hazardous materials? When are these materials considered "construction materials?"
- What are the environmental impacts of using tailings as cover materials?
- Although DTSC said that the tailings pose no threat now, what are the environmental impacts if the Eagle Crest hydroelectric project is approved or if the landfill project begins operating?
- Will hazardous waste be transported to the site from the Kaiser/Fontana hazardous waste cleanup?

Joshua Tree National Park

Windblown Litter

- JTNP has been marked as an International Biosphere Reserve, which makes it different from any other place where a project could be developed.
- JTNP is located in a desert environment. A desert, is by definition, a sparse environment. Therefore, placing 20,000 tons of trash per day (nutrient loading) in a place whose natural ecology is characterized by sparsity would have far reaching effects. Many of these effects will fall into the category of being subtle, long-term, and hard to detect.

- The proposed action should be characterized as a "eutrophication[1] experiment." The project proponent should prepare a list of all potential environmental changes, test the effect of those changes with experiments, and propose mitigation for those effects.
- Wind blown litter from the landfill site onto JTNP should be addressed. Issues to be considered include on-site wind direction and meteorology, the type and nature of refuse to be landfilled at Eagle Mountain, the recovery methods for windblown trash, and the differences in the types of materials delivered to Eagle Mountain by trains and trucks.

Wilderness Experience:

- The impact on the Wilderness Experience during the construction and operation of the landfill should be assessed.
- The EIS/EIR may need to take into consideration JTNP's backcountry wilderness management plan. The National Park Service (NPS) is currently engaged in holding scoping meetings with the public about backcountry uses.
- The boundaries of the park have been expanded and wilderness areas designated. What will the potential impacts be?

Landfill

Capacity:

- Is there need for a new landfill in the region?
- Are existing landfills reaching capacity? Are they leaking?
- What are the operations and maintenance costs of closing other landfills? Should they be expanded instead? Can they be expanded?
- Will the Eagle Mountain landfill adequately address the landfill capacity needed by Riverside County cities in the future?
- Can the long-term approval conditions be carried out by the applicant?
- How much waste will be accepted by the proposed Eagle Mountain Landfill and Recycling Center?
- How much capacity would be set aside for Riverside County?
- How much out-of-state municipal solid waste will be accepted? Given the Carbone decision, the issue of the acceptance of municipal solid waste from out of state may need to be explored.
- Landfill mining should be considered as a potential alternative in the EIS/EIR.
- How will the recycling component of the project operate?
- What will the range of impacts be if urban landfills continue to operate?
- What will the operations and maintenance costs be? What are similar costs associated with closing other landfills?

Seismic Activity:

[1] Eutrophication - the process of becoming well-nourished either naturally or artificially.

- Are there earthquake faults in the vicinity of the landfill site?
- What is the ability of the landfill liner to withstand the shock of an earthquake in the vicinity?
- Concern about landfills following Loma Prieta and Northridge earthquakes. EIS/EIR should review impacts to area landfills following those events.
- Obtain groundwater quality data for area landfills following seismic events to determine whether effects occurred--no known effects to date.
- Integrate holocene fault work done subsequent to the original EIS/EIR.

Technology

- Is wet cell technology practical for use at Eagle Mountain?
- Will baled waste be used at the site?
- Will waste rock serve as the final cover?
- Will green waste not burned at the Colmac facility wind up in local landfills?
- What is a "state-of-the-art" landfill liner design?
- What is being done in Europe for landfilling?

Monitoring

- Provide updated vadose zone gas monitoring and other monitoring systems in the revised document.

Permits

- What is the status of the permits that have been issues for the project?
- The previous permits issued are no longer valid. The NOP states that many of the permits are still valid. Which ones are considered still valid?

Recreation (non JTNP)

- The railway passes through the Salton Sea State Recreation Area. What are the potential effects to park resources and visitors including noise, aesthetics, vibration, noise and air quality?

Socioeconomics

- Will Riverside County would benefit financially from having this landfill approved?
- If the project is not approved, would garbage still be trucked and railroaded through Riverside County to another landfill?
- What is the financial condition of MRC to carry-out this project? Does MRC have enough money to clean up a potential environmental disaster, such that Riverside County can be ensured that they will not have to pay the bill?

- The economic impacts of the project should be analyzed and disclosed.

Townsite

- The description of the townsite in the NOP is unclear. The proposed actions should be clearly described in the Project Description.
- Does sufficient sewer and water infrastructure capacity exist to serve the site if it grows?
- Has there been coliform contamination in the surrounding area from lagoon leakage?
- Road surfacing and paving will impact visibility and drainage.

Traffic (Rail & Road)

- What is the impact of project-associated increased in truck traffic on both Eagle Mountain road, and the proposed alternate route (Kaiser Road)?
- Using Kaiser Road may be more beneficial for the desert tortoise.
- School kids cross Eagle Mountain road everyday, and school buses must cross Eagle Mountain Road at two points, whereas they cross Kaiser Road at only one point.
- The increased truck traffic on Kaiser road may be disturbing and dangerous to the elder residents that live in this area.
- With respect to the increased rail traffic, heavy noise and vibration is of concern.
- Train containers are neither air-tight nor water-tight and therefore, VOC's could leak from the trains and contaminate the surrounding area. Along the train tracks, water is diverted to percolation wells to eliminate the possibility of flooding. How will dripping leachate affect groundwater quality (the diversions will directly introduce leachate into the groundwater, especially in areas like Ferrum Junction, where trains can sit for days)?
- It was suggested that garbage should be transported on trucks and trains operating on compressed natural gas.
- All information previously prepared for the original EIR should be updated to include changes in the background data, traffic counts, and local projects that affect traffic.
- What traffic impacts will occur in local communities?
- Kaiser Road already has too much traffic and is inappropriate for truck use.
- Will there be opportunities to reuse methane for other uses such as trucks, trains, and public transit?
- Train traffic impacts should be disclosed throughout the California Desert Conservation Area.
- The EIS/EIR should address the impacts of reopening the tracks to heavy train use.
- Impacts to County highways should be addressed.
- Identify frequency of rail and truck traffic through the City of Ontario.

Water Quality

- Water quality data developed during the previous permitting process should be reflected in the revised EIS/EIR.
- Some additional vadose zone gas modeling may be required during the permitting process.
- Will the Eagle Crest Energy Project use of nearby water wells degrade water quality for Townsite use?
- Will there be chemical reactions within the landfill that could ultimately affect water quality?
- Will compounds stay in the cover material or migrate?
- Will fines in the seepage water be mobilized and transported?
- The status of the 401 water quality certification for the ECEC project should be clarified.
- What are the potential impacts of using tailing materials for cover and lining materials?

Other Issues

- The Draft EIR should include a statement that reads, "permitting agencies have no authority to require more than what's in that EIR" (The word "more" refers to environmental controls).
- With respect to public lands, does the land exchange include the lagoon (which is claimed to be public land)? The leachate treatment ponds may be leaking and they are on public land.
- What is the schedule for the project?
- All mitigation measures associated with the proposed project should be monitored in accordance with AB3180 requirements and reported to SCAG.

Appendix A-2
Statement of Decision

FILED
KENNETH E. MARTONE
Clerk of the Superior Court
JUL 26 1994
By: J. PETERSON, Deputy

SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF SAN DIEGO

NATIONAL PARKS AND CONSERVATION ASSOCIATION; EAGLE MOUNTAIN LANDFILL OPPOSITION COALITION; CITY OF COACHELLA; STEVE W. CLUTE, an individual; DANIEL S. ROMAN, an individual; RICHARD M. MARSH, an individual, Petitioners and Plaintiffs, vs. COUNTY OF RIVERSIDE, a public body, corporate and politic; THE BOARD OF SUPERVISORS OF THE COUNTY OF RIVERSIDE, AND THE INDIVIDUAL MEMBERS THEREOF, in their official capacity, Respondents on Writ Petition and Defendants on Complaint, KAISER STEEL RESOURCES, INC.; a corporation; MINE RECLAMATION CORPORATION, INC., a corporation; KAISER EAGLE MOUNTAIN, INC., a corporation; BROWNING-FERRIS INDUSTRIES, INC., a corporation, Real Parties in Interest on Writ Petition and Defendants on Complaint.	CASE NO. 662907 **STATEMENT OF DECISION**

/ / /

LAURENCE R. CHARPIED, an individual; DONNA J. CHARPIED, an individual, Petitioners, vs. COUNTY OF RIVERSIDE, AND BOARD OF SUPERVISORS OF RIVERSIDE COUNTY, Respondents.	CASE NO. 663033 **STATEMENT OF DECISION**
MINE RECLAMATION CORPORATION, a corporation; KAISER STEEL RESOURCES, INC., a corporation; KAISER STEEL EAGLE MOUNTAIN, INC., a corporation; BROWNING-FERRIS INDUSTRIES, INC., a corporation; and DOES 1 through, 100, inclusive, Real Parties in Interest.	

The petition for writ of mandate brought by National Parks and Conservation Association, Eagle Mountain Landfill Opposition Coalition, City of Coachella, Steve Clute, and Richard Marsh ("National Parks"), and the petition for writ of mandate brought by Laurence and Donna Charpied ("Charpieds"), came on regularly for hearing on June 23, 24 and 30, 1994, in Department 38 of the above-entitled court, the Honorable Judith McConnell, Judge presiding.

The petitions are being addressed collectively since the arguments made in each are nearly identical.

Joel Moskowitz appeared as attorney for National Parks, and the Charpieds appeared in pro per. Martin Nethery, Sheryl Walker, and Scott Gordon appeared as counsel for respondents County of Riverside, Riverside County Board of Supervisors and individual members thereof, and real parties in interest, Mine Reclamation

/ / /

Corporation, Kaiser Steel Resources, Inc., and Kaiser Eagle Mountain, Inc.

The Court, having fully considered all the evidence and heard the arguments of all parties, now issues this Statement of Decision.

THE LANDFILL PROJECT

The Eagle Mountain open pit iron ore mine was the location of extensive mining operations by Kaiser Steel Corporation from 1948 to 1983. The mine is located approximately 200 miles east of Los Angeles, 50 miles west of the Arizona border, 10 miles north of Desert Center, and approximately one and a half miles south of Joshua Tree National Monument. The mining operation resulted in the excavation of three large open pits; each, one to two miles long. The mining operation ceased in 1983, and Kaiser has leased the mine site to the prospective operator of the landfill.

Mine Reclamation Corporation ("MRC") plans to utilize the open pits left from the mining operation to create what all parties have agreed is the largest landfill in the country. The landfill footprint will encompass approximately 2,262 acres within a larger project area of 4,654 acres. The landfill will have the capacity to accept up to 20,000 tons per day of wastes for a minimum of 115 years.

The landfill will receive most of the waste from Los Angeles and other Southern California counties. Ninety percent of the garbage will be shipped by rail and the balance by truck. All waste will be delivered after processing at materials recovery facilities ("MRFs") which accept delivery of trash from homes and

/ / /

businesses and compact the waste into containers for transportation.

THE MATERIALS RECOVERY FACILITIES

The landfill accepts only nonhazardous solid waste and inert wastes that have been processed through MRFs. The Draft EIR states a typical MRF would require about 10 to 30 acres and an enclosed structure of about 100,000 square feet. (3 A.R. 741.) The garbage is delivered to the MRF by truck and dumped on the floor of the structure. Workers sort through the waste and remove unacceptable materials such as hazardous waste, sewage sludge, radioactive, biological or infectious waste, and other materials needing special handling. Recyclable materials may be recovered. The remaining wastes are compacted and packaged into containers that hold up to 25 tons each and then loaded onto rail cars, each of which holds 10 containers. The containers are then transported to the landfill. (3 A.R. 742.) Approximately 10 percent of the wastes will be transported by truck rather than rail.

The Draft EIR notes that since the exact locations of the MRFs are unknown, specific land use conditions and impacts of these facilities are not discussed, although considerations would include noise, dust, odors, traffic and other impacts. (3 A.R. 1101.) There is no further discussion of the MRFs either as part of the project description itself or as an environmental consequence of the landfill project. Petitioners contend this is an error.

THE TOWNSITE

The town of Eagle Mountain was developed to serve the Kaiser mining operation and at one time there were 3,700 people living there. The townsite consists of homes, dormitories, and commercial

and community facilities to support the residents. Since the mine closed in 1982, the population has dropped to 174. Most of the supporting commercial and institutional facilities are closed. In the town there is a small remaining contingent of Kaiser Steel employees and a return-to-custody facility that currently houses 271 parole violators with a maximum population of 500 inmates.

The townsite is expected to house the landfill employees, their families, and supporting populace. There is no mention in the EIR of the total population anticipated, but it is expected there would be significant growth. In addition, since the water is not safe to drink, a fluoridation plant will be required to treat the water.

The townsite was originally included as part of the project description. The Notice of Preparation of an Environmental Impact Report specifically included " . . . the continuance and/or expansion of existing residential and commercial land uses . . . ." (4 A.R. 1293.) When the Draft EIR was issued, however, the townsite was specifically omitted from the project description, although no explanation was given for the omission. The Final EIR contains no explanation for this change.

The explanation for the deletion of the townsite appears in a memorandum dated January 10, 1993, from SCS Engineers, consultants on this project, to MRC, their client. This memorandum stated the townsite would be deleted from the project description for the landfill and dealt with separately and concurrently. This letter acknowledges the deletion may create problems:

/ / /

/ / /

> The County may be resistant to the preparation of two specific plans, arguing that a single plan would provide a more comprehensive perspective and a better understanding of the relationship between the landfill and development in the town. To address this concern we should use the line of reasoning discussed below.
>
> (36 A.R. 18694.)

The letter goes on to explain the reason for the deletion:

> Almost by nature, a Specific Plan for the town raises a set of urban development and design issues above and beyond those related to the landfill. Unless limited to the level of growth generated by the landfill, a Specific Plan for the town may also require a level of EIR analysis above that provided in the environmental document currently being prepared.
>
> (36 A.R. 18694.)

The significance of this change will be discussed below.

PREPARATION AND APPROVAL OF ENVIRONMENTAL IMPACT STATEMENT/ENVIRONMENTAL IMPACT REPORT ("EIS/EIR")

In 1989, MRC began the process of obtaining necessary land use approvals from the County of Riverside. At the same time, negotiations were initiated with the federal Bureau of Land Management ("BLM") for a land exchange necessary to develop the project. Part of the land on which the landfill project is proposed is federal public land which Kaiser proposes to acquire in exchange for other land it owns that is not needed for the landfill.

By July 9, 1991, the Draft EIS/EIR had been issued by the County. On June 3, 1992, the Final EIS/EIR was released; the Planning Commission voted June 17, 1992 to disapprove the landfill project and reject the Final EIS/EIR. On November 3, 1992, the Board of Supervisors approved the landfill project and the Final

/ / /

EIS/EIR. The National Parks' action was filed December 3, 1992. The Charpieds filed their petition December 2, 1992.

STANDARD OF REVIEW

All parties agree the review by this Court is governed by California Public Resources Code Section 21168.5 which provides, "the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the agency has not proceeded in a manner required by law or if the determination or decision is not supported by substantial evidence."

This Court is not to "pass upon the correctness of the EIR's environmental conclusions, but only upon its sufficiency as an informative document." [Laurel Heights Improvement Assn. vs. Regents of Univ. of Calif. (1988) 47 Cal.3d 376, 392.]

FINDINGS

I. The project description is legally insufficient since it fails to include the townsite which will have significant environmental effects.

The growth and development of the townsite is a foreseeable and inevitable consequence of the landfill project. The townsite was removed from the project description because the projected development would require "a level of EIR analysis above that provided in the environmental document currently being prepared." (36 A.R. 18694.) In addition, MRC's consultants felt that keeping the townsite out of the EIR would allow Kaiser more flexibility in preparing a plan for the townsite that envisioned growth beyond that generated by the landfill. (36 A.R. 18695.) In other words, the townsite was dropped from this EIR and would be part of a separate plan and EIR for exactly the reason the law forbids: to

preclude a meaningful evaluation of the true environmental consequences of the landfill project.

There can be no meaningful review of the environmental impacts of a project if the project is not accurately and completely described. Respondents urge the Court to adopt a narrow definition of the term "project". The law compels otherwise.

CEQA Guidelines Section 15378 provides:

> (a) 'Project' means the whole of an action, which has a potential for resulting in a physical change in the environment, directly or ultimately . . .
>
> . . .
>
> (b) The term 'project' refers to the activity which is being approved and which may be subject to several discretionary approvals by governmental agencies. The term 'project' does not mean each separate governmental approval.

The courts have identified several ways in which project descriptions may be deficient. One error is the piecemeal approach to development such that the EIR addresses only a part of an overall project and the true consequences are minimized. CEQA mandates "that environmental considerations . . . not become submerged by chopping a large project into many little ones -- each with a minimal potential impact on the environment -- which cumulatively may have disastrous consequences." Bozung vs. Local Agency Formation Com. (1975) 13 Cal.3d 263, at 283-284. The record is clear that the townsite was omitted from the subject project and was to be addressed concurrently in a separate plan exactly to achieve the result proscribed by CEQA. In fact, the public could not know from reading either the Draft EIR or the Final EIR what would be probable effects of the growth in the townsite engendered by the landfill. There is no discussion of the environmental

consequences of reintroducing a significantly larger population to this remote desert area -- what are the effects of sewage, traffic, drainage, noise, air pollution, light pollution, animals? Since the townsite grows because of the landfill project, the consequences of that growth must be discussed.

At the very least, it must be said of the townsite that "1) it is a reasonably foreseeable consequence of the initial project; and 2) the future expansion or action will be significant in that it will likely change the scope or nature of the initial project or its environmental effects." Laurel Heights Improvement Assn. vs. Regents of Univ. of Calif., supra, at 396.

II. The EIS/EIR is inadequate in that it fails to evaluate the cumulative impacts of the landfill project and the townsite expansion.

CEQA requires that an EIR consider the cumulative impacts of the project under review in conjunction with other planned development in the area. The purpose of such an analysis is obvious:

> [An] agency may not [treat] a project as an isolated 'single shot' venture in the face of persuasive evidence that it is but one of several substantially similar operations, each of which will have the same polluting effect in the same area. To ignore the prospective cumulative harm under such circumstances could be to risk ecological disaster . . . .
>
> Whitman vs. Board of Supervisors, 88 Cal.3d 397, at 408, quoting Natural Resources Defense Council vs. Callaway, 524 F.2d 79, 88 (2d Cir. 1975).

Under CEQA Guideline 15131, this analysis requires the following three elements:

/ / /

/ / /

/ / /

(1) Either:

(A) A list of past, present, and reasonably anticipated future projects producing related or cumulative impacts, including those projects outside the control of the agency, or

(B) A summary of projections contained in an adopted general plan or related planning document which is designed to evaluate regional or areawide conditions. Any such planning document shall be referenced and made available to the public at a location specified by the Lead Agency;

(2) A summary of the expected environmental effects to be produced by those projects with specific reference to additional information stating where that information is available, and

(3) A reasonable analysis of the cumulative impacts of the relevant projects. An EIR shall examine reasonable options for mitigating or avoiding any significant cumulative effects of a proposed project.

Compliance with the law could also have been achieved here by a full discussion of the townsite expansion under the rubric of "cumulative effects". The EIR fails in this regard. At most, the EIR discusses the environmental effects of the landfill on the townsite, but nowhere is there a discussion of the effects of the expanded townsite on the environment. The Draft EIR only comments briefly on the growth that would be induced in the townsite and concludes the impacts of this growth are not significant. (3 A.R. 1133.) There is not substantial evidence to support that conclusion.

III. The MRFs need not be included in the Project Description.

Petitioners contend that the same arguments with regard to the townsite apply to the MRFs. In particular, they contend that since the landfill will not operate without the MRFs, the two are inextricably linked and the MRFs' impacts on the environment must

be more fully described. They argue that although the exact location and size of any particular MRF is unknown at this time, it is known that MRFs will be built and will have significant negative environmental consequences. Because of this, they urge this case is analogous to No Oil, Inc. vs. City of Los Angeles (1987) 196 Cal.3d 223, in which the exact locations of the oil pipelines were unknown but the effect of the pipelines when built was adequately described as part of the EIR for the exploratory oil wells. The court in No Oil held it was proper to so describe a part of a project even though the exact site was unknown.

Just as oil wells cannot function without pipelines, so this landfill cannot operate without MRFs. However, if an oil well is not drilled, there will be no pipeline. In this situation, there will be trash and facilities to dispose of that trash whether the Eagle Mountain landfill operates or not. It is entirely appropriate to consider those trash facilities wherever they may be at the time they are planned. At that time, a full environmental assessment can be completed. The discussion of the MRFs in this EIR is adequate.

IV. The EIS/EIR is inadequate in that it describes the proposed hydroelectric project at this location as remote and speculative.

Rather than repeat the findings and orders of this Court in the companion case of Eagle Mountain Energy Company vs. Riverside County Board of Supervisors, San Diego Superior Court Case Number 662906, the Court incorporates those findings and orders by reference and makes them a part of this order.

/ / /

/ / /

V. The evidence is insufficient to support the conclusions in certain critical areas.

The Desert Tortoise

There is not substantial evidence to support the conclusion that the mitigation measures will be effective in reducing the risks to the desert tortoise. The desert tortoise is a threatened species which is endangered by the proposed landfill in many ways. The trains threaten the tortoise, truck traffic is a threat, and ravens attracted to the garbage are a threat. The effects of the expanded townsite are not even mentioned, but many negative consequences could be expected from that. As previously discussed, those impacts must be addressed.

The EIR discusses the threats and describes proposed mitigation measures including monitoring, relocation, construction of culverts under the road and rails, berms over the tracks, and barriers, among other measures. The EIR concludes: ". . . given the proposed tortoise mitigation, tortoise impacts appear mitigable to nonsignificance." (6 A.R. 2652.) There is nothing in the record to support this conclusion. At best, one can say the expected results of the mitigation measures are unknown. See, for example, 9 A.R. 4280: "If an acute raven control program becomes necessary, but is not implementable due to political or legal constraints, then the impact to the desert tortoise would be significant but unmitigable." Later on the same page the same report states: "There is no guarantee that tortoises will use culverts under the tracks . . . ."

The law does not require elimination of all risks to a threatened species; what is required is a finding that is supported

by substantial evidence. The Board might well conclude the risks to the tortoise are significant and the mitigation measures untested and yet still conclude the project should be approved. The analysis must be supported by sufficient evidence so that the elected officials can say the benefits of the project outweigh any impacts which are not mitigated. San Franciscans for Reasonable Growth vs. City and County of San Francisco (1984) 151 Cal.3d 61. That is not what was done here.

Seismic Activity

There is insufficient evidence to support the conclusion that the liners will withstand seismic activity. Respondents contend the Board's commitment to require full compliance with all applicable regulations is sufficient safeguard. That argument should provide little comfort to an area as uncertain as Southern California is about earthquake safety. As recently as last January, Southern Californians witnessed the collapse of major structures built according to current standards. At best, the County can merely conclude that there is no definitive answer as to whether the liners will withstand seismic activity.

The cases o'n which respondents rely are distinguishable. In Laurel Heights Improvement Assn. vs. Regents of Univ. of Calif. (1988), supra, the court found that a mitigation measure for noise was sufficient when the EIR explained that noise would be kept within the performance standard allowed by the City Ordinance. Similarly, in Sacramento Old City Assn. vs. City Council (1991) 229 Cal.App.3d 1011, the court upheld a mitigation plan for parking and traffic impacts based on several measurable alternatives.

/ / /

Counting cars and measuring decibel levels are profoundly different from measuring the ability of a landfill line to withstand an earthquake. To say that the liners will meet state and federal standards is not acceptable where the consequences of failure are so profound. Surely there is some technical or scientific basis for the contention this or any liner will withstand an earthquake. The law requires that evidence to be in the record so that it can be commented upon and tested in the public arena.

The ability of the landfill's containment system to capture and control leachate fails for the same reason: saying government standards will be met is not sufficient in a situation such as this where the risk to the groundwater is high. Once contamination occurs, it will be impossible to rectify. The public needs to hear the evidence to support the finding that this system will work.

A related problem is the failure to allow the public an opportunity to comment on studies conducted on the existence of Holocene faults. Landfills such as the one proposed are prohibited within 200 feet of a recently active fault. At the time of the Draft EIR, there was no information on recent seismic activity within the area of the fault. The County's consultants concluded the lack of an evaluation of the faults within the area was a defect in the Draft EIR, since existence of faults could prove fatal to the project.

A subsequent study was undertaken by consultants retained by MRC. While discussion of some of this work appears in the record of the hearings before the Board, there was no opportunity for the

/ / /

public to review and comment upon this significant data. That was an error.

Joshua Tree National Monument

The Joshua Tree National Monument is a Class 1 air quality unit and World Biosphere Reserve. It is located one and a half miles from the proposed landfill. The Final EIR identifies several areas of concern -- air quality, biological resources, and windblown litter and dust -- and concludes the project will not have a significant adverse effect on the monument. This is not supported by the record.

The National Park Service ("NPS") submitted detailed comments setting forth its concerns about the effects of the landfill. (8 A.R. 3651-3657.) The NPS was so concerned about the negative effects of the project and the lack of effective mitigations that it opposed the project altogether. Those concerns have not been adequately addressed. In fact, the Responses to Comments set forth at 6 A.R. 2633-2634 completely ignore the harm this project will cause by destroying the natural peace and solitude, the clean air, the pristine desert -- the "wilderness experience" referred to by petitioners. Nowhere is the impact on the desert tortoise that live in the monument addressed -- in fact, no survey of that population has been taken. And the conclusion in the EIR that windblown litter and dust will be insignificant is completely groundless.

VI. The Development Agreement is valid.

At the time it approved the Final EIR, the Board entered into a development agreement governing the landfill project. (1 A.R. 0197.) The agreement purports to apply to both the Kaiser land

leased to MRC and the BLM land which was the subject of a proposed exchange. Petitioners contend the agreement is invalid.

Government Code Section 65864 provides in part as follows:

> The Legislature finds and declares that:
>
> (a) The lack of certainty in the approval of development projects can result in a waste of resources, escalate the cost of housing and other development to the consumer, and discourage investment in and commitment to comprehensive planning which would make maximum efficient utilization of resources at the least economic cost to the public.
>
> (b) Assurance to the applicant for a development project that upon approval of the project, the applicant may proceed with the project in accordance with existing policies, rules and regulations, and subject to conditions of approval, will strengthen the public planning process, encourage private participation in comprehensive planning, and reduce the economic costs of development.
>
> (c) The lack of public facilities, including, but not limited to, streets, sewerage, transportation, drinking water, school, and utility facilities, is a serious impediment to the development of new housing. . . .

In furtherance of those legislative purposes, Government Code Section 65865 authorizes cities and counties to enter into agreements "with any person having a legal or equitable interest in real property for the development of the property . . . ." This statute specifically authorizes cities to enter into such agreements even though the property is not yet within the jurisdiction of the city. Petitioners contend the development agreement here is invalid since MRC did not have a legal or equitable interest in all the lands subject to the agreement.

The agreement is conditional in that it specifically provides that it shall not become effective until the developer acquires a

fee interest in the BLM property which would be part of the proposed landfill. (1 A.R. 0205-0206.) The developer already had a significant legal interest in the bulk of the adjacent land which would be developed. At the time of entering into the development agreement, it was reasonably foreseeable the developer would acquire an interest in the BLM land.

In order to effect the legislative intent, the Court concludes under the particular circumstances of this case, the law should be liberally construed to allow this agreement to stand. To hold otherwise would unduly restrict public agencies from working with private entities to develop housing and other facilities needed to support the growing population.

VII. The failure to consider the Level I Contaminate Survey was error.

In September 1992, a Level I Contaminate Survey was conducted by BLM in connection with the proposed land exchange which indicated the presence of toxic waste at the site. (Exhibit A to Charpieds' Opening Brief.) The report of this survey was not available for consideration in the Final EIR, nor was it available before the Board approved the landfill project. Respondents argued vigorously at the hearing that the issue of hazardous materials is now moot since investigations conducted subsequent to the filing of these petitions have shown conclusively that there is no danger. The existence of the Level I Contaminate Survey should have been disclosed to the public and any investigation pursuant to that report should have been done prior to the certification of the Final EIR. Since consideration of this project is ordered returned

/ / /

to the Board of Supervisors for other reasons, the Court concludes the survey and its significance can be considered at that time.

DISPOSITION

WHEREFORE, let a peremptory writ of mandate issue as follows:

1. The Board of Supervisors' certification of the FEIS/FEIR and any and all approvals of the landfill project rendered by respondents in connection with the certification of the FEIS/FEIR including, without limitation: (a) Resolution 92-517 Adopting Comprehensive General Plan Amendment No. 209; (b) Resolution 92-505 Adopting Specific Plan No. 252; (c) Ordinance 348.3477 approving Change of Zone 5499; and (d) Ordinance No. 664.43 approving Development Agreement No. 47, are set aside and declared void.

2. Respondents and each named real party in interest and their respective agents, officers, employees and servants and all persons acting on their behalf or in concert with them, are directed to suspend all activity related to the development of the landfill project unless and until respondents have complied with the requirements of CEQA and the State Guidelines.

3. Respondents are directed to prepare a new FEIS/FEIR consistent with the findings herein.

4. Any award of fees and costs will be determined pursuant to appropriate noticed motions.

IT IS SO ORDERED.

DATED: JUL 2 6 1994

JUDITH McCONNELL
Judge of the Superior Court

Appendix A-3
Correspondence

COUNTY OF RIVERSIDE
TRANSPORTATION AND LAND MANAGEMENT AGENCY

Planning Department

Aleta J. Laurence
Director of Planning

June 12, 1995

Mr. and Mrs. Laurence R. Charpied
P.O. Box 321
45-200 Kaiser Road
Desert Center, CA 92239

Re: Eagle Mountain Landfill and Recycling Center EIS/EIR
Notice of Preparation/Scoping Session

Dear Mr. and Mrs. Charpied:

You and your counsel, Joseph A. Roman, have recently indicated both orally and in writing that you will be unable to provide "meaningful comment" on the Notice of Preparation (NOP) for the above-referenced Project because the NOP provides on page 8 that many of the previously-issued permits for the Project are still valid but will need to be re-evaluated in light of the current environmental review process.

We are puzzled by your statements, but offer the following explanation for our position.

The NOP refers to responsible agency permits, the issuance and validity of which were not before the Court in the prior EIR litigation that you and others filed. The Court's Judgment and Writ of Mandate in that litigation was directed to the County of Riverside only, its approvals and its EIR certification. The status of permits issued by agencies other than the County is a matter within the sole discretion of those agencies. Accordingly, unless such agencies have actually rescinded or revoked their permits (as the Regional Water Quality Control Board appears to have done after issuance of the NOP), the County must assume they are still valid (i.e., it must assume they remain unrescinded and unrevoked). All the NOP is pointing out, and accurately so, is that permits previously issued to the Project applicant which were not before the Court, and therefore are not affected by the Court's Judgment, remain so issued unless otherwise indicated by the issuing agencies but will have to be re-evaluated by those agencies based on the new environmental review process currently under way.

In addition, you should note that none of these permits currently authorizes any construction or operations activity, nor could they, since the Court's Writ of Mandate invalidated the County's land use approvals. Without those approvals and the certification of a new EIR, there is no landfill project.

4080 Lemon Street, 9th Floor•Riverside, California 92501•(909) 275-3200
P. O. Box 1409•Riverside, California 92502-1409•FAX (909) 275-3157

The contents of this Project NOP far exceed the information disclosure requirements of the California Environmental Quality Act (CEQA). Your stated concern regarding an inability to comment may be the result of a mistaken belief as to the purpose and scope of the NOP in the overall CEQA process. The primary purpose of an NOP is to provide responsible agencies, trustee agencies, and federal agencies involved in approving or funding the project with sufficient information to enable them to make meaningful responses to the NOP. At a minimum, CEQA requires that the NOP must provide a description of the Project, its location, a map, and a statement of the Project's probable environmental effects. (*See* CEQA Guidelines section 15082(a)(1), copy enclosed.) The NOP prepared for the Project provides this required, basic information and much more, well beyond CEQA's minimum requirements. It includes a detailed description of the Project, including the relevant background of the prior EIR and the San Diego Superior Court Judgment regarding deficiencies in the prior EIR, a discussion of landfill operations, closure requirements, construction details and information concerning the adjacent Eagle Mountain Townsite. In addition, it contains a section regarding alternatives to the Project, including the no project alternative, a reduced landfill operations alternative, and alternative sites.

In short, given the NOP's full description of the project, we fail to see how the NOP's brief statement concerning responsible agency permits previously issued affects in any way your ability to provide meaningful comments to the County concerning the scope of the new EIR for the Project. There is nothing "misleading" about the NOP's statement regarding permits previously issued having to be re-evaluated in light of the new environmental review process, nor does that statement affect your ability to provide comment on the scope of review in the new EIR in light of the Court's Judgment and Writ of Mandate.

We are making every attempt possible to accommodate concerns of the public and interested agencies, and are taking the extra step of seeking out the litigants individually to get detailed comments concerning the scope of the EIR. We thank you for your input and anticipated cooperation in this matter.

Very truly yours,

RIVERSIDE COUNTY PLANNING DEPARTMENT

Aleta J. Laurence

Aleta J. Laurence, AICP, Planning Director

AJL:dm
Enclosure

cc: Members, Riverside County Board of Supervisors
William Katzenstein, County Counsel
Ron Goldman, Riverside County Planning Department
David Mares, Riverside County Planning Department
Tom Peters, CH2M Hill
Gary W. Johnson, MRC
Joseph A. Roman, Esq.

G:\SP.TM\SP305\LETTERS\SP305LTR.013
6/12/95

proposed negative
provide members of
before the negative

tion shall be sent to
ject and every other
roject.
agency or a trustee
cted by the project,
State Clearinghouse

Clearinghouse for
in 30 days unless a

eclaration.
nmendation to the
n before making its

of the lead agency
omments received
prove the negative
received that there
ant effect on the

which a negative
ermination.

e where possible,

have a significant

d pursuant to the

be examined.
ation shall be filed

ation shall be filed
be located. If the
, the notice of

on a list of such
e approval under

with the existing
cy.

15081. Decision to Prepare an EIR.

The EIR process starts with the decision to prepare an EIR. This decision will be made either during preliminary review under Section 15060 or at the conclusion of an initial study after applying the standards described in Section 15064.

15082. Determination of Scope of EIR.

(a) Notice of Preparation. Immediately after deciding that an environmental impact report is required for a project, the lead agency shall send to each responsible agency a notice of preparation stating that an environmental impact report will be prepared. This notice shall also be sent to every federal agency involved in approving or funding the project and to each trustee agency responsible for natural resources affected by the project.

(1) The notice of preparation shall provide the responsible agencies with sufficient information describing the project and the potential environmental effects to enable the responsible agencies to make a meaningful response. At a minimum, the information shall include:

(A) Description of the project,

(B) Location of the project indicated either on an attached map (preferably a copy of a U.S.G.S. 15' or 7 1/2' topographical map identified by quadrangle name, or by a street address in an urbanized area), and

(C) Probable environmental effects of the project.

(2) A sample for a notice of preparation is shown in Appendix J. Public agencies are free to devise their own formats for this notice. A copy of the initial study may be sent with the notice to supply the necessary information.

(3) To send copies of the notice of preparation, the lead agency shall use either certified mail or any other method of transmittal which provides it with a record that the notice was received.

(4) The lead agency may begin work on the draft EIR immediately without awaiting responses to the notice of preparation. The draft EIR in preparation may need to be revised or expanded to conform to responses to the notice of preparation. A lead agency shall not circulate a draft EIR for public review before the time period for responses to the notice of preparation has expired.

(b) Response to Notice of Preparation. Within 30 days after receiving the notice of preparation under subsection (a), each responsible agency shall provide the lead agency with specific detail about the scope and content of the environmental information related to the responsible agency's area of statutory responsibility which must be included in the draft EIR.

(1) The response at a minimum shall identify:

(A) The significant environmental issues and reasonable alternatives and mitigation measures which the responsible agency will need to have explored in the draft EIR; and

(B) Whether the agency will be a responsible agency or trustee agency for the project.

(2) If a responsible agency fails by the end of the 30 day period to provide the lead agency with either a response to the notice or a well justified request for additional time, the lead agency may presume that the responsible agency has no response to make.

(3) A generalized list of concerns not related to the specific project shall not meet the requirements of this section for a response.

(c) Meetings. In order to expedite the consultation, the lead agency, a responsible agency, a trustee agency, or a project applicant may request one or more meetings between representatives of the agencies involved to assist the lead agency in determining the scope and content of the environmental information which the responsible agency may require. Such meetings shall be convened by the lead agency as soon as possible, but no later than 30 days, after the meetings were requested. On request, the

MRS. KAY CENICEROS
DISTRICT 3 SUPERVISOR
COUNTY OF RIVERSIDE
P.O. BOX 1486
RIVERSIDE CA 92502-1527

LARRY & DONNA CHARPIED
P.O. BOX 321
DESERT CENTER CA 92239

JUNE 2, 1995

Dear Supervisor Ceniceros,

This letter is a follow-up to the May 30, 1995 regular Board of Supervisors meeting, which the Charpieds, and Robert Roman, attended and spoke during the oral communications portion of the Board's agenda.

One of the issues brought up, was the inaccuracy of the Notice of Preparation the County registered with the State's Clearinghouse. You asked a woman from the Planning Department, we think her name is Donna, to look into our concerns. To date, nobody from the Planning Department has contacted any of us to inquire what we feel is inaccurate.

Secondly, we brought up the fact that MRC runs this County, which seemed to agitate you. We gave many examples citing this very bold claim, and the one the Board focused on most was the $182 the Court ordered the County to pay us. Deputy County Counsel said the County needs MRC's permission to spend any of the $900,000.00 that MRC placed into the County's Trust Fund. Mr. Vickers indicated this was a stipulation to the money. Since Mr. Vickers discussed the stipulation(s) attached to the Trust Fund monies, the public would now like to know what other stipulations are attached ? We have attempted contacting Mr. Vickers regarding this, but to no avail. We hope the Board will direct someone to forward this information to us.

Lastly, find enclosed, a copy of a check for $182 from MRC. This check is drafted from MRC's account. Attached with the check,is a copy of a letter from MRC's Gary Johnson. It states, in part, "We understand you raised this issue at the Board of Supervisors...if you have questions or a concern...please contact us directly...". The issue of the Court allowed costs, is a judgement against the County - all of the issues we brought up on May 30th are COUNTY issues. We will **NEVER** "go directly" to this two bit corporation to settle concerns that we have with our elected officials.

In closing, in the last go 'round with these gangsters, the County Staff mislead and held back information from this Board - THIS WILL NOT BE ALLOWED AGAIN ! You said Mrs. Ceniceros that we need to use the public process. We did last time, and the process took us all the way to Superior Court. This time the process will end with the Riverside Board of Supervisors.

Sincerely,

(Larry Charpied)

(Donna Charpied)

enc/cc:
ROBERT ROMAN
SUPERVISOR BOB BUSTER
SUPERVISOR JOHN TAVAGLIONE
SUPERVISOR ROY WILSO
SUPERVISOR TOM MULLEN
JAY VICKERS, DEPUTY COUNTY COUNSEL
GARY JOHNSON

Appendix A-4
Legal Description of Site

KAISER RESOURCES, INC.

EAGLE MOUNTAIN TOWNSITE

ASSESSOR'S PARCEL NUMBERS

Township 4 South, Range 14 East
San Bernardino Meridian

ASSESSOR'S PARCEL NO.	SECTION
807-030-005	2
807-030-007	2
807-030-008	2
807-030-011	2
807-040-007	2
807-040-010	2
807-050-004	2
807-060-008	2
807-060-009	2
807-070-002	2
807-070-004	2
807-070-005	2
807-070-008	2
807-080-007 (Por.)	1
807-080-009	1
807-091-001	1

MINE RECLAMATION CORPORATION
EAGLE MOUNTAIN LANDFILL AND RECYCLING CENTER

ASSESSOR'S PARCEL NUMBERS

Township 3S., Range 14E.

Assessor's Parcel No.*	Section
por. 701-370-005	28
por. 701-370-009	28
por. 701-370-031	28
por. 701-370-007**	32
por. 701-370-030	33
por. 702-380-018	25
por. 701-380-017	26
por. 701-380-016	27
701-380-022	27
701-380-023	27
701-380-011	34
701-380-019	34
701-380-020	34
701-380-009	35
701-380-010	35
701-380-012	35
701-380-021	35
701-380-024	35
701-380-025	35

SP App., Attachment 2
GPA App., Attachment 4
Change of Zone App., Attachment 2
Development Agreement App., Attachment 5
Rev. Reclamation Plan App., Attachment 1

701-380-006	36
701-380-007	36
701-380-015	36

Township 3S., Range 15E.

por. 800-090-018	31
807-030-003	2
807-030-010	2
807-040-006	2
807-040-008	2
807-040-009	2
807-050-005	2
807-060-008	2
807-070-007	2
807-080-004	1
807-080-005	1
por. 807-080-007	1
807-080-008	1
807-092-001	1

Township 4S., Range 15E.

807-112-001	6
807-112-013	6
por. 807-112-017	6

* Where the Assessor's records have not been updated to reflect lot line adjustments, the notation "por." has been made.

** Assessor's records indicate that Parcel 701-370-007 lies in Section 32, outside of the Landfill Specific Plan area. A portion of that parcel lies, however, also in Section 33 within the Landfill area.

SP App., Attachment 2
GPA App., Attachment 4
Change of Zone App., Attachment 2
Development Agreement App., Attachment 5
Rev. Reclamation Plan App., Attachment 1

EAGLE MOUNTAIN TOWNSITE LEGAL DESCRIPTION

All that portion of land lying within Sections 1 and 2, Township 4 South, Range 14 East, San Bernardino Meridian, in the County of Riverside, State of California, described as follows:

BEGINNING at the Southwest corner of the Northeast One-Quarter of the Southwest One-Quarter of said Section 2;

Thence N89°36'15"E along the South One-Sixteenth line of said Section 2, a distance of 3295.88 feet to the Northeast corner of the West One-Half of the Southeast One-Quarter of the Southeast One-Quarter of said Section 2;

Thence S00°22'57"E along the East line of said West One-Half of the Southeast One-Quarter of the Southeast One-Quarter of said Section 2, a distance of 1320.50 feet to a point in the South line of said Section 2;

Thence N89°36'43"E along said South line of said Section 2, a distance of 659.01 feet to the Southeast corner of said Section 2, said corner also being the Southwest corner of said Section 1;

Thence N89°39'05"E along the South line of said Section 1, a distance of 1981.39 feet to the Southeast corner of the West One-half of the Southeast One-Quarter of the Southwest One-Quarter of said Section 1;

Thence N00°24'04"W along the East line of said West One-Half of the Southeast One-Quarter of the Southwest One-Quarter of said Section 1, a distance of 1321.26 feet to the Northeast corner of said West One-Half of the Southeast One-Quarter of the Southwest One-Quarter of said Section 1;

Thence S89°37'56"W along the South One-Sixteenth line of said Section 1, a distance of 1320.53 feet to the Southwest corner of the Southeast One-Quarter of the Northwest One-Quarter of the Southwest One-Quarter of said Section 1;

Thence N00°23'11"W along the West line of said Southeast One-Quarter of the Northwest One-Quarter of the Southwest One-Quarter of said Section 1, a distance of 660.48 feet to the Northwest corner of said Southeast One-Quarter of the Northwest One-Quarter of the Southwest One-Quarter of said Section 1;

Thence S89°36'57"W along the South line of the Northwest One-Quarter of the Northwest One-Quarter of the Southwest One-Quarter of said Section 1, a distance of 660.14 feet to a point in the West line of said Southwest One-Quarter of said Section 1, said point also being the Southwest corner of said Northwest One-Quarter of the Northwest One-Quarter of the Southwest One-Quarter of said Section 1;

Thence N00°22'31"W along said West line of said Southwest One-Quarter of said Section 1, a distance of 660.30 feet to the Northwest corner of said Southwest One-Quarter of said Section 1;

Thence N89°36'46"E along the North line of said Southwest One-Quarter of said Section 1, and continuing along the North line of the Southeast One-Quarter of said Section 1, a distance of 3946.77 feet to the beginning of a 2100.00 foot non-tangent curve concave to the Southwest (the initial radial line bears N20°16'08"E), said point also being in the Northeasterly line of Kaiser Road as shown by Record of Survey plat recorded in Book 39 of Records of Survey, at Pages 52 through 54, inclusive, Records of Riverside County, State of California;

Thence Northwesterly, along said Northeasterly line of Kaiser Road, along said curve, through a central angle of 13°51'35", an arc length of 507.99 feet to an angle point in said Northeasterly line of Kaiser Road;

Thence non-tangent to said curve, S87°35'01"W, along the North line of said Kaiser Road, a distance of 610.96 feet to an angle point therein;

Thence N02°26'14"W a distance of 36.41 feet to an angle point therein;

Thence S89°36'46"W, continuing along said North line of Kaiser road, parallel to the East-West Center One-Quarter line of said Section 1, a distance of 858.53 feet to a point of intersection with the Northeasterly line of Old Kaiser Truck Road, as constructed;

Thence N62°24'15"W along said Northeasterly line of Old Kaiser Truck Road, as constructed, through its various courses, a distance of 2406.62 feet to the beginning of a 4000.00 foot tangent curve, concave to the Southwest;

Thence Northwesterly, along said curve, through a central angle of 06°42'12" an arc length of 467.98 feet;

Thence tangent to said curve, N69°06'27"W, a distance of 132.24 feet to the beginning of a 300.00 foot tangent curve, concave to the Northeast;

Thence Northwesterly, along said curve, through a central angle of 12°50'52" an arc length of 67.27 feet;

Thence tangent to said curve, N56°15'35"W, a distance of 165.23 feet to the beginning of a 1200.00 foot tangent curve, concave to the Southwest;

Thence Northwesterly, along said curve, through a central angle of 14°35'57" an arc length of 305.76 feet;

Thence tangent to said curve, N70°51'32"W, a distance of 126.79 feet to the beginning of a 720.00 foot tangent curve, concave to the South;

Thence Westerly, along said curve, through a central angle of 23°09'11" an arc length of 290.95 feet;

Thence tangent to said curve, S85°59'17"W, a distance of 36.03 feet to the beginning of a 720.00 foot tangent curve, concave to the Northeast;

Thence Northwesterly, along said curve, through a central angle of 17°08'09" an arc length of 215.34 feet;

Thence non-tangent to said curve, N76°53'09"W, a distance of 931.54 feet to the beginning of a 800.00 foot non-tangent curve, concave to the Northeast (the initial radial line bears S13°06'50"W);

Thence Northwesterly, along said curve, through a central angle of 25°58'35", an arc length of 362.70 feet;

Thence non-tangent to said curve, N85°59'39"W, a distance of 210.02 feet to the beginning of a 1200.00 foot non-tangent curve, concave to the Northwest (the initial radial line bears S85°53'05"E);

Thence Southwesterly, along said curve, through a central angle of 23°03'39", an arc length of 482.98 feet;

Thence non-tangent to said curve, S34°03'07"W, a distance of 518.21 feet to the beginning of a 1600.00 foot tangent curve, concave to the Southeast;

Thence Southwesterly, along said curve, through a central angle of 34°28'13" an arc length of 962.59 feet to a point in the West line of the Southeast One-Quarter of the Northwest One-Quarter of said Section 2;

Thence tangent to said curve, S00°25'06"E, along said West line of the Southeast One-Quarter of the Northwest One-Quarter of said Section 2 and continuing along the West line of the Northeast One-Quarter of the Southwest One-Quarter of said Section 2, a distance of 1788.21 feet to the POINT OF BEGINNING of the Parcel of Land being described herein.

Said parcel of Land contains 17,574,533.93 square feet, 403.46 acres, more or less.

Prepared under the direct supervision of:

Lindsey Lamberson, RCE 32203

REGISTERED PROFESSIONAL ENGINEER
LINDSEY LAMBERSON
No. 32203
Exp.12/31/96
CIVIL
STATE OF CALIFORNIA

4-3-95
Date

LEGAL DESCRIPTION OF THE EAGLE MOUNTAIN LANDFILL SPECIFIC PLAN AREA

April 19, 1993

That portion of Sections 25 through 28 and Sections 33 through 36, in Township 3 South, Range 14 East and Section 31 in Township 3 South, Range 15 East and Sections 1 and 2, in Township 4 South, Range 14 East and Section 6 in Township 4 South, Range 15 East, San Bernardino Meridian, in the County of Riverside, State of California, described as follows:

Beginning at the West 1/16 corner in the South line of said Section 28 which bears N89°36'56"E 1317.62 feet from the Southwest corner thereof;

Course No. 1 Thence N89°36'56"E 1317.62 feet along the South line of said Section 28 to the South 1/4 corner thereof;

Course No. 2 Thence N00°27'19"W 1319.57 feet along the North-South center-section line of said Section 28 to the Center-South 1/16 corner thereof;

Course No. 3 Thence N89°37'10"E 2634.91 feet along the South 1/16 line of said Section 28 to the South 1/16 corner in the West line of said Section 27;

Course No. 4 Thence N00°28'10"W 1319.40 feet along the West line of said Section 27 to the West 1/4 corner thereof;

Course No. 5 Thence N89°34'31"E 5279.62 feet along the East-West center-section line of said Section 27 to the East 1/4 corner thereof;

Course No. 6 Thence N89°39'46"E 2636.77 feet along the East-West center-section line of said Section 26 to the center 1/4 corner thereof;

Course No. 7 Thence S00°26'27"E 1317.31 feet along the North-South center-section line of said Section 26 to the Center-South 1/16 corner thereof;

Course No. 8 Thence N89°42'50"E 1318.97 feet along the South 1/16 line of said Section 26 to the Southeast 1/16 corner thereof;

Course No. 9 Thence N00°26'27"W 1318.48 feet along the East 1/16 line of said Section 26 to the Center-East 1/16 corner thereof;

Course No. 10 Thence N89°39'46"E 1318.98 feet along the East-West center-section line of said Section 26 to the East 1/4 corner thereof;

Course No. 11 Thence N89°30'49"E 5423.21 feet along the East-West center-section line of said Section 25 to the East 1/4 corner thereof;

Course No. 12 Thence S00°54'15"W 2600.87 feet along the East line of said Section 25 to the Northwest corner of said Section 31;

SP App., Attachment 4
GPA App., Attachment 3
Change of Zone App., Attachment 3
Development Agreement App., Attachment 2
Rev. Reclamation Plan App., Attachment 2

Course No. 13 Thence N89°30'26"E 1427.11 feet along the North line of said Section 31 to the West 1/16 corner thereof:

Course No. 14 Thence S0°25'04"W 272.69 feet along the West 1/16 line of said Section 31 to a point of intersection with the Northerly line of that certain Right of Way granted to the Metropolitan Water District of Southern California under LA053305 for Dikes and Ditches:

Course No. 15 Thence S82°33'26"W 162.67 feet along said Northerly line to an angle point therein:

Course No. 16 Thence continuing S51°01'05"E 206.09 feet along the Southwesterly line of said Right of Way to a point of intersection with the West 1/16 line of said Section 31:

Course No. 17 Thence S0°25'04"W 905.95 feet along the West 1/16 line of Section 31 to the Northwest 1/16 corner thereof:

Course No. 18 Thence N89°26'45"E 1112.81 feet along the North 1/16 line of said Section 31 to a point of intersection with the Southwesterly line of that certain Right of Way previously referred to in Course No. 16:

Course No. 19 Thence S51°01'05"E 501.96 feet along said Southwesterly line to a point of intersection with the Westerly line of the Metropolitan Water District Right of Way (650 feet wide as shown on M.W.D. Right of Way Maps No. 127-P2 and P3). said point being in a non-tangent curve concave Easterly with a radius of 825.00 feet and a radial line of S88°50'03"W:

Course No. 20 Thence Southerly along said Westerly line and the arc of said non-tangent curve 57.36 feet through a central angle of 3°59'01":

Course No. 21 Thence S05°08'58"E 953.69 feet along said Westerly line to a point of intersection with the East-West center-section line of said Section 31:

Course No. 22 Thence S89°23'03"W 935.10 feet along said center-section line to a 1/64 corner thereon:

Course No. 23 Thence S00°24'26"W 1330.14 feet to a 1/64 corner on the South 1/16 line of said Section 31:

Course No. 24 Thence N89°21'15"E 665.69 feet along the South 1/16 line of said Section 31 to the Center-South 1/16 corner thereof:

Course No. 25 Thence continuing N89°16'56"E 398.52 feet along said South 1/16 line to a point of intersection with the Westerly line of said Metropolitan Water District Right of Way:

Course No. 26 Thence S05°08'58"E 357.01 feet along said Westerly line to an angle point therein:

Course No. 27 Thence continuing S13°10'38"E 892.36 feet along said Westerly line to an angle point therein:

Course No. 28 Thence continuing S06°18'05"E 2622.20 feet along said Westerly line to an angle point therein:

Course No. 29 Thence continuing S02°38'55"E 1467.29 feet along said Westerly line to an angle point therein:

Course No. 30 Thence continuing S14°08'14"W 1292.81 feet along said Westerly line to a point of intersection with the South line of said Section 6;

Course No. 31 Thence N89°03'36"W 765.88 feet along the South line of said Section 6 to the South 1/4 corner thereof:

Course No. 32 Thence continuing S87°34'53"W 868.80 feet along the South line of said Section 6 to a point of intersection with the Northeasterly line of Kaiser Road as shown on a Record of Survey, as per plat recorded in Book 39 of Records of Survey, pages 52 through 54, records of said County:

Course No. 33 Thence N48°44'23"W 3279.31 feet along said Northeasterly line to the beginning of a tangent curve concave Southwesterly with a radius of 2100.00 feet:

Course No. 34 Thence Northwesterly along said Northeasterly line and the arc of said tangent curve 1277.52 feet through a central angle of 34°51'20":

Course No. 35 Thence continuing S87°34'52"W 610.65 feet along the Northerly line of said Kaiser Road on a non-tangent line to an angle point therein:

Course No. 36 Thence continuing N02°26'23"W 36.41 feet along said Northerly line to an angle point therein:

Course No. 37 Thence continuing S89°36'37"W 857.80 feet along said Northeasterly line to a point of intersection with the Northeasterly line of Old Kaiser Truck Road, as constructed;

Course No. 38 Thence following along the Northeasterly line of Old Kaiser Truck Road, as constructed, through its various courses, N62°25'43"W 2405.61 feet to the beginning of a tangent curve concave Southwesterly with a radius of 4000.00 feet:

Course No. 39 Thence Northwesterly along the arc of said tangent curve 467.99 feet through a central angle of 6°42'12":

Course No. 40 Thence N69°07'55"W 132.24 feet to the beginning of a tangent curve concave Northeasterly with a radius of 300.00 feet:

Course No. 41 Thence Northwesterly along the arc of said tangent curve 67.27 feet through a central angle of 12°50'52":

Course No. 42	Thence N56°17'03"W 165.23 feet to the beginning of a tangent curve concave Southwesterly with a radius of 1200.00 feet;
Course No. 43	Thence Northwesterly along the arc of said tangent curve 305.77 feet through a central angle of 14°35'57";
Course No. 44	Thence N70°53'00"W 126.79 feet to the beginning of a tangent curve concave Southerly with a radius of 720.00 feet;
Course No. 45	Thence Westerly along the arc of said tangent curve 290.95 feet through a central angle of 23°09'11";
Course No. 46	Thence S85°57'49"W 36.03 feet to the beginning of a tangent curve concave Northerly with a radius of 720.00 feet;
Course No. 47	Thence Westerly along the arc of said tangent curve 215.34 feet through a central angle of 17°08'09";
Course No. 48	Thence N76°54'37"W 931.54 feet along a non-tangent line to the beginning of a tangent curve concave Northeasterly with a radius of 800.00 feet;
Course No. 49	Thence Northwesterly along the arc of said tangent curve 362.70 feet through a central angle of 25°58'35";
Course No. 50	Thence leaving said Northeasterly line of Old Kaiser Truck Road, N86°01'07"W 210.02 feet along a non-tangent line to the beginning of a non-tangent curve concave Westerly with a radius of 1200.00 feet and a radial line of S85°54'33"E;
Course No. 51	Thence Southerly along the arc of said non-tangent curve 482.98 feet through a central angle of 23°03'39";
Course No. 52	Thence S34°01'39"W 518.12 feet along a non-tangent line to the beginning of a tangent curve concave Easterly with a radius of 1600.00 feet;
Course No. 53	Thence Southerly along the arc of said tangent curve 962.59 feet through a central angle of 34°28'13" to a point of tangency in the West 1/16 line of said Section 2;
Course No. 54	Thence S00°26'34"E 1782.39 feet along the West 1/16 line of said Section 2 to the Southwest 1/16 corner thereof;
Course No. 55	Thence S89°38'08"W 1318.56 feet along the South 1/16 line of said Section 2 to the South 1/16 corner in the West line thereof;
Course No. 56	Thence N00°27'03"W 3958.42 feet along the West line of said Section 2 to the Northwest corner thereof;

Course No. 57 Thence S89°37'09"W 5279.61 feet along the South line of said Section 34 to the Southwest corner thereof:

Course No. 58 Thence S89°37'42"W 2640.91 feet along the South line of said Section 33 to the South 1/4 corner thereof:

Course No. 59 Thence continuing S89°36'31"W 207.90 feet along the South line of said Section 33 to a point of intersection with the Northeasterly line of the Eagle Mountain Wilderness Study Area (CDCA 3341):

Course No. 60 Thence N63°06'05"W 326.24 feet along said Northeasterly line to an angle point therein:

Course No. 61 Thence continuing N25°00'43"W 658.55 feet along said Northeasterly line to an angle point therein:

Course No. 62 Thence continuing N53°00'47"W 229.27 feet along said Northeasterly line to an angle point therein:

Course No. 63 Thence continuing N39°58'09"W 368.02 feet along said Northeasterly line to an angle point therein:

Course No. 64 Thence continuing N08°33'43"W 206.04 feet along said Northeasterly line to the beginning of a non-tangent curve concave Southwesterly with a radius of 930.00 feet and a radial line of N48°34'27"E:

Course No. 65 Thence continuing along said Northeasterly line and Northwesterly along the arc of said non-tangent curve 415.26 feet through a central angle of 25°35'00":

Course No. 66 Thence continuing N67°00'33"W 704.22 feet along said Northeasterly line and along a tangent line to the beginning of a tangent curve concave Northeasterly with a radius of 2200.00 feet:

Course No. 67 Thence continuing along said Northeasterly line and Northwesterly along the arc of said tangent curve 501.37 feet through a central angle of 13°03'27" to a point of intersection with the West line of said Section 33:

Course No. 68 Thence leaving the Northeasterly line of said Eagle Mountain Wilderness Study Area, N00°29'42"W 492.55 feet along the West line of said Section 33 to the West 1/4 corner thereof:

Course No. 69 Thence continuing N00°29'14"W 1319.94 feet along the West line of said Section 33 to the North 1/16 corner thereof:

Course No. 70 Thence N89°36'56"E 1316.60 feet along the North 1/16 line of said Section 33 to the Northwest 1/16 corner thereof:

Course No. 71 Thence N00°26'34"W 1319.94 feet along the West 1/16 line of said Section 33 to the point of beginning.

Excepting therefrom that portion of any mining claim, patented or unpatented, which lies outside of the boundary line described herein.

The parcel described herein contains 4654 Acres, more or less.

Harold E. Robinson, PLS 3069



Appendix A-5
Recipients of Draft EIS/EIR

Appendix B-5 Recipients of Draft EIS/EIR	
Individuals and Organizations	Richard Milanovich, Chairman
	Glenn R. Stewart, Ph.D. Robert T. Filler
	Susan Hickman James Dodson
	John Rotenberry Arthur Lowe
	Mr. & Mrs. L. R. Charpied Joel Moskowitz
	Dan and Robert Roman Dollie Irwin
	Carolyn Toenjes Georgianna Foodos
	Rita Baker Edi Harmon
	Fit Environment Ultrasystems Environmental
	Press Enterprise Jose R. Allen
	Richard Marsh Desert Citizens Against Pollution
	Eagle Crest Energy Company
Libraries	UC Riverside Library U.S. Geological Survey Library
	San Bernardino Co. Library Los Angeles Public Library
	Riverside Central Library San Bernardino Co. Library
	Desert Hot Springs Public Library Imperial Co. Library
	San Bernardino Co. Library (Yucca Valley) Coachella Valley Reg. Library
	San Bernardino Co. Library Palm Desert Public Library
	Palm Springs Library Center Palo Verde District Library
	California State Library Coachella Public Library
	Cathedral City Library Palm Springs Library Center
	Rancho Mirage Library San Bernardino Co. Library (Joshua Tree)
	College of the Desert Library Lake Tamarisk Library

Appendix B-5 Recipients of Draft EIS/EIR	
	Riverside Community College Library
	California State Library
	Indio Branch Library
Individuals and Organizations	Edward H. Waldheim, Coachella Valley Water Dist. Laura J. Simonek, MWD
	Southern Pacific Railroad Margit Baldivid Rusche
	Ms. Mary Belardo
	Mrs. Dana Bell Mrs. Isabella Burns
	Mr. Ray Butler Mr. Dick Conti
	Mr. Buford Crites Mr. Ian Davidson
	Mr. Nick Ervin Mr. William W. Glauz
	Mr. John Hohstadt Mr. Jim Reddy
	Mr. Sam Sharp Mr. Jon Stone
	Ms. Marsha Turoci Mr. Steven Hartman
	Defenders of Wildlife Desert Fishes Council
	Desert Tortoise Council Desert Tortoise Preserve Comm
	Beula Edmiston, Friends of Wildlife Natural Resources Defense Counc.
	Wilderness Society Wildlife Society
	Ann Dennis, Sierra Club Sierra Club Legal Def Fund
	Sierra Club, San Diego Chapter Debbie Sease, Sierra Club
	Living Desert Reserve Coachella Vly Audubon Society
	San Bernardino Audubon Society CA Native Plant Society
	California Wilderness Coalition Desert Protective Council
	Desert Bighorn Council Environmental Defense Fund
	Bighorn Institute W. Douglas Kari

Appendix B-5 Recipients of Draft EIS/EIR	
	Brian Huse, National Park Conservation Assoc.
	Supervisor, San Bernardino Nat'l Forest
Federal Officials and Agencies	Superintendent, Joshua Tree National Park Office of Federal Activities
	National Park Service Hon. Barbara Boxer
	Hon. Diane Feinstein Hon. Ken Calvert Hon. Jim Battin Hon. Brett Granlund
	Hon. Jerry Lewis Bureau of Reclamation
	U.S. Fish & Wildlife Service Charles McDonald, Angeles Nat'l Forest
	FERC
	Department of Transportation Ray Murray, National Park Service
	U.S. Army Corps of Engineers Hon. Sonny Bono
	Marine Corps Air Station
Counties, Cities, and Local Agencies	Office of the Mayor, Blythe
	Office of the Mayor, Coachella Office of the Mayor, Desert Hot Springs
	Office of the Mayor, Indian Wells Eldon Lee, Indio
	City Manager, Palm Desert City Manager, Palm Springs
	Office of the Mayor, Rancho Mirage Office of the Mayor, Cathedral City
	Director, Riverside Planning Director, San Bernardino Planning
	Jurg Heuberger, Imperial County Chrm Board of Supervisors, Riverside
	So. Cal. Assn. of Gov. South Coast AQMD
	San Bernardino Co Museum Ventura Co Planning Dept
	Santa Barbara Co Planning Dept Santa Barbara County APCD
	San Diego County APCD Coachella Valley Assoc of Gov.
	Board of Supervisors
	Water Quality Control Bd
	Office of Environmental Affairs Long Range Planning

Appendix B-5 Recipients of Draft EIS/EIR	
State of California Officials, Agencies, and Regional Agencies	Mike Guisti
	Carrie Shaw Hon. William Leonard
	California Dept of Corrections Dept of Water Resources
	Ms. Barbara Fry State Water Resources Control Board
	Integrated Waste Management Board Caltrans-District 8
	Hon. David Kelley Hon. Jim Battin
	Hon. Bruce Thompson Hon. Ray Haynes
	State Lands Commission
	Air Resources Control Board
	Office of Historic Preservation
	Regional Water Quality Control Board
	Santa Barbara County Planning Department
	California Department of Corrections
Native American	Twenty-Nine Palms Reservation Torres Martinez Reservation
	Cahuilla Reservation Native American Heritage Commission
	Cabazon Reservation Tribal Chair, Robert Martin

Appendix B
Project Description Supporting Information

B-1 List of Federal and State Regulations for the Design and Operation of MSW Landfills
B-2 BLM Land Use Classification
B-3 IBLA Stay
B-4 Bid Sheets
B-5 Construction Considerations

Appendix B-1
List of Federal and State Regulations for the Design and Operation of MSW Landfills

B.1 Federal and State Regulations for the Design and Operation of Municipal Solid Waste Landfills

B.1.1 Regulatory Compliance

This section summarizes the regulatory framework which, in addition to NEPA and CEQA guidelines, would be addressed as part of the proposed action. The proposed project must comply with applicable federal, state, and local rules and regulations for the design, construction and operation of municipal solid waste landfills. The federal regulations are found in Title 40 of the Code of Federal Regulations (CFR). The state regulations are found in Titles 8, 14, 22, and 23 of the California Code of Regulations (CCR). Local regulations consist of rules that are enforced by the South Coast Air Quality Management District (SCAQMD).

B.1.2 Federal Rules and Regulations

RCRA Subtitle D, 40 CFR 258—Criteria for Municipal Solid Waste Landfills

This regulation establishes minimum national criteria for design of municipal solid waste landfills, groundwater monitoring, and potential corrective actions associated with the operation of landfills. The regulations include requirements or specifications for, but not limited to, the following:

- Protection from the 100-year flood.
- Seismic design to withstand the maximum probable earthquake.
- Liner systems, specifically composite liners.
- Leachate collection and removal systems.
- Drainage control.
- Landfill gas collection, control, and monitoring for landfill operations, closure, and postclosure.
- Groundwater monitoring.
- Landfill closure and final cover.
- Landfill postclosure maintenance.

This regulation was amended on October 1, 1993, to incorporate the final rule on implementation of all requirements of Part 258. According to the final rule, the compliance date for implementation of all requirements is October 9, 1993, unless otherwise specified.

This applies to all municipal solid waste landfill units that receive waste on or after October 9, 1993, except for those that qualify for an extension.

California has received approval from the EPA to implement Subtitle D. The Regional Administrator for EPA Region IX has fully approved California's solid waste landfill regulatory program under Subtitle D. California's approved Subtitle D solid waste landfill program is implemented by legislative changes to the California Public Resources Code, by modifications to CCR Title 14, and by the State Water Resources Control Board (SWRCB) issuance of Resolution NO. 93-62, Policy for Regulations of Discharges of Municipal Solid Waste.

RCRA Subtitle C, 40 CFR 261 and 264—Identification and Listing of Hazardous Waste

This regulation presents criteria for identifying solid wastes that are subject to regulation as hazardous wastes under Subtitle C of RCRA. The four general characteristics of a hazardous waste are toxicity, corrosivity, reactivity, and ignitability. Subpart C of 40 CFR 261 presents criteria defining when a waste exhibits one or more of these characteristics. Subpart D of 40 CFR 261 presents a list of substances or mixtures specifically defined as hazardous wastes. If solid wastes determined to be hazardous, they must be managed in accordance with regulations governing hazardous wastes (40 CFR 264).

B.1.3 State Rules and Regulations

Title 14, CCR, Division 7, Chapter 3—Minimum Standards for Solid Waste Handling and Disposal

Title 14, CCR, Division 7, provides the state's minimum standard for the management of facilities that handle and/or dispose of solid waste. It is administered by the California Integrated Waste Management Board (CIWMB) and the designated Lead Enforcement Agencies (LEAs), and establishes general standards to provide required levels of performance for facilities that handle and/or dispose of solid waste. This regulation covers various solid waste facilities including, but not limited to:

- Landfills
- MRFs and transfer stations
- Composting facilities

For landfills, Title 14, CCR, Division 7, requires specific closure plans, and postclosure monitoring and maintenance plans. The regulation includes specific requirements for owners/operators of landfills to provide financial assurance of their ability to pay the full cost associated with closure and postclosure.

Title 23, CCR, Division 3, Chapter 15—Discharges of Wastes to Land

Title 23, CCR, Chapter 15, includes, but is not limited to, the state's regulation for the disposal and/or management of various types of waste, as it relates to the protection of

surface and groundwater. Of specific interest for the proposed action are those sections of CCR Title 23, Chapter 15, that address Class III nonhazardous solid waste landfills. The regulation includes specific requirements for the design and construction of landfills that are intended to reduce the risk of surface water and groundwater contamination. The regulation includes requirements or specifications for, but not limited to, the following:

- Protection from the 100-year flood
- Seismic design to withstand maximum probable earthquake
- Liner systems
- Leachate collection and removal systems
- Drainage control
- Groundwater monitoring
- Landfill closure and final cover
- Landfill postclosure maintenance

Title 23, CCR, Chapter 15, also provides RWQCB with its authority for adoption of Waste Discharge Requirements (WDRs) to protect waters of the state from contamination. Under this regulation Regional Water Quality Control Board (RWQCB) will regulate systems or activities of the proposed action that have the potential to discharge waste or waste constituents to surface or groundwaters. When adopting WDRs, RWQCB follows requirements of Title 23, CCR, Chapter 15, and the California Porter-Cologne Water Quality Act of 1985. The RWQCB establishes limits on discharges and specific monitoring requirements as conditions of approval for the WDRs. The limitations are intended to ensure that discharges will not adversely affect the beneficial uses of waters of the state.

Title 23, CCR, Chapter 15, Article 5, was recently established to require that holders of WDRs provide financial assurance of their ability to fund potential corrective action programs in the event that contamination of waters of the state occur from their actions. Article 5 requires that the permittee estimate the potential corrective action program costs and demonstrate the ability to pay for the corrective action required.

Title 22, CCR, Chapter II—Criteria for Identification of Hazardous Waste

This section presents criteria for identifying hazardous wastes that must be managed according to the Hazardous Substances Control Act. The four general characteristics of a hazardous waste are toxicity, corrosivity, reactivity, and ignitability. Section 66261 presents the criteria defining when a waste exhibits one or more of these characteristics. Section 66261 also presents Total Threshhold Limit Concentration (TTLC) and Soluble Threshold Limit Concentration (STLC). Wastes containing concentrations of substances that exceed the TTLC or STLC are considered hazardous wastes. According to Title 23, CCR, Chapter 15, hazardous wastes cannot be disposed of in Class III landfills.

B.1.4 SCAQMD Rules and Regulations

Regulation IV: Prohibitory Rules

Rule 403, Fugitive Dust: This rule limits onsite activities such that concentrations of fugitive dust at the property line shall not be visible and the downwind particulate concentrations shall not exceed 100 micrograms per cubic meter above upwind concentrations.

Regulation XI: Source-Specific Standards

Rule 1150.1, Control of Gaseous Emissions from Active Landfills: This rule requires installation of a landfill gas control system and combustion, treatment, sale, or other equivalent method of landfill gas disposal; requires perimeter landfill gas monitoring probes to evaluate offsite migration; limits concentrations of total organic compounds to 50 parts per million over a certain area of the surface of the landfill; and limits maximum concentration of organic compounds (measured as methane) to 500 parts per million at any point on the surface of the landfill.

Appendix B-2
BLM Land Use Classification

Appendix B-2 Bureau Of Land Management Multiple Use Class Guidelines				
Resource Uses	**Multiple-Use Class C Controlled Use (Wilderness Management)*** (Note: Class C identifies areas (preliminarily) recommended for wilderness designation by Congress. These guidelines summarize the kinds of management likely to be used in these areas after formal designation of wilderness by Congress)	**Multiple-Use Class L Limited Use**	**Multiple-Use Class M Moderate Use**	**Multiple-Use Class I Intensive Use**
1. Agriculture	Agricultural uses (excluding livestock grazing) are not allowed. Note: Agriculture is permitted in Unclassified lands.		Agricultural uses may be allowed on suitable land classified for these purposes. Prospective leases for potential desert crops, e.g., jojoba, guayule or others, may be allowed only after NEPA requirements are met.	
2. Air Quality	These areas will be managed to protect their air quality and visibility in accordance with Class II objectives of Part C of the Clean Air Act Amendments unless otherwise designated another class by the State of California (see 42 USC 7474, and the final regulations, if and when promulgated) as a result of recommendations developed by any BLM air-quality management plan.			
3. Water Quality	These areas will be managed to maintain and enhance both surface- and groundwater resources.	Areas designated in this classes will be managed to provide for the protection and enhancement of surface and groundwater resources, except for instances of short-term degradation caused by water development projects. Best management practices, developed by the Bureau during the planning process outlined in the Clean Water Act, Section 208, and subsequently, will be used to avoid degradation and to comply with Executive Order 12088.	Areas designated in this class will be managed to minimize degradation of the water resources. Best management practices, developed by the Bureau during the planning process outlined in the Clean Water Act, Section 208, and subsequently, will be used to avoid degradation and to comply with Executive Order 12088.	Areas designated in this class will be managed to minimize degradation of water resources. Best management practices, developed by the Bureau during the planning process outlined in the Clean Water Act, Section 208, and subsequently, will be used to keep impacts on water quality minimal and to comply with Executive Order 12088.
4. Cultural and Paleontological Resources	Archaeological and paleontological values will be preserved and protected. Procedures described in 36 CFR 800 will be observed where applicable. A Memorandum of Agreement has been signed by the BLM, the California State Historic Preservation Officer, and for cultural resources the President's Advisory Council on Historic Preservation to protect cultural resource values.			
5. Native American Values	Native American cultural and religious values will be preserved where relevant and protected where applicable. Native American group(s) shall be consulted. Memorandums of Agreement and Understanding have been signed between BLM and the Native American Heritage Commission pertaining to Native American concerns and cultural resources. Procedures described in 36 CFR 800 will be observed where applicable. A Memorandum of Agreement has been signed by the BLM, the California State Historic Preservation Officer, and for cultural resources in the President's Advisory Council on Historic Preservation to protect cultural resource values.			
6. Electrical Generation Facilities	Electrical generation plants are not allowed.	Electrical generation plants may be allowed (see wind/solar/ geothermal, below.)	All types of electrical generation plants may be allowed in accordance with state, federal, and local laws.	

Appendix B-2 Bureau Of Land Management Multiple Use Class Guidelines				
Resource Uses	**Multiple-Use Class C Controlled Use (Wilderness Management)*** (Note: Class C identifies areas (preliminarily) recommended for wilderness designation by Congress. These guidelines summarize the kinds of management likely to be used in these areas after formal designation of wilderness by Congress)	**Multiple-Use Class L Limited Use**	**Multiple-Use Class M Moderate Use**	**Multiple-Use Class I Intensive Use**
—Nuclear and Fossil Fuel Powerplants		Existing facilities may be maintained and upgraded or improved in accordance with special-use permits or by amendments to rights-of-way.		
	Not allowed.		May be allowed in accordance with federal, state, and local laws.	
—Wind/Solar Powerplants	Not allowed.	May be allowed after NEPA requirements are met.		
—Geothermal Powerplants	Not allowed.	May be allowed pursuant to licenses issued under 43 CFR Section 3250, et. seq. NEPA requirements will be met.		
7. Transmission Facilities	New transmission facilities for electricity, gas, water, and telecommunications are not allowed and new licenses or rights-of-way for these purposes will not be granted, except as provided for in the Wilderness Act of 1964—16 USC 1133(d)(4) or as may be specified by Congress.	New gas, electric, and water transmission facilities and cables (coaxial or fiber optic) for interstate communications may be allowed only within designated corridors (see Energy Production and Utility Corridors Element). NEPA requirements will be met.		
	Existing facilities may be maintained subject to Wilderness Management Plan	Existing facilities within designated corridors may be maintained and upgraded or improved in accordance with existing right-of-way grants or by amendments to right-of-way grants. Existing facilities outside designated corridors may only be maintained but not upgraded or improved.		
	New licenses or rights-of-way for distribution facilities to serve private properties will not be granted. Existing facilities may be maintained or improved but not expanded.	Existing facilities may be maintained and upgraded or improved in accordance with existing right-of-way grants.		

Appendix B-2 Bureau Of Land Management Multiple Use Class Guidelines				
Resource Uses	**Multiple-Use Class C Controlled Use (Wilderness Management)*** (Note: Class C identifies areas (preliminarily) recommended for wilderness designation by Congress. These guidelines summarize the kinds of management likely to be used in these areas after formal designation of wilderness by Congress)	**Multiple-Use Class L Limited Use**	**Multiple-Use Class M Moderate Use**	**Multiple-Use Class I Intensive Use**
		New distribution systems may be allowed and will be placed underground where feasible except where this would have a more detrimental effect on the environment than surface alignment. In addition, new distribution facilities shall be placed within existing rights-of-way where they are reasonably available.	New distribution facilities may be allowed and shall be placed within existing rights-of-way where they are reasonably available. NEPA requirements will be met.	
8. Communication Sites	New communication sites are not allowed unless required for protection of wilderness values or visitors.	New sites may be allowed. NEPA requirements will be met. A 30-day public comment period is required for environmental assessments for long distance line-of-sight communication systems of three or more sites.		
	Maintenance and operation of existing sites and facilities may be allowed subject to Wilderness Management Plan	Existing facilities may be maintained and utilized in accordance with right-of-way grants and applicable regulations.		
9. Fire Management	Fire suppression measures will be taken in accordance with specific wilderness fire management plans to be followed by the authorized officer, and may include use of motorized vehicles, aircraft, and fire retardant chemicals.	Fire suppression measures will be taken in accordance with specific fire management plans subject to such conditions as the authorized officer deems necessary, such as use of motorized vehicles, aircraft, and fire retardant chemicals.		
10. Vegetation —Harvesting (Native Plant)	Removal of vegetation, noncommercial, may be allowed by permit only after an EA or EIS is prepared and after development of necessary stipulations.	Removal of vegetation, commercial or noncommercial, may be allowed by permit only after NEPA requirements are met and after development of necessary stipulations.		

Appendix B-2 Bureau Of Land Management Multiple Use Class Guidelines				
Resource Uses	**Multiple-Use Class C Controlled Use (Wilderness Management)*** (Note: Class C identifies areas (preliminarily) recommended for wilderness designation by Congress. These guidelines summarize the kinds of management likely to be used in these areas after formal designation of wilderness by Congress)	**Multiple-Use Class L Limited Use**	**Multiple-Use Class M Moderate Use**	**Multiple-Use Class I Intensive Use**
—Harvesting by Mechanical Equipment	Not allowed.	Harvesting by mechanical equipment may be allowed by permit only.		
—Rare, Threatened, and Endangered Species, State and Federal	All state and federally listed species will be fully protected. Actions which may jeopardize the continued existence of federally listed species will require consultation with the U.S. Fish and Wildlife Service.			
—Sensitive Plant Species (including candidates for listing by FWS: FWS Species of Concern; Species on List 2 (CNPS, 1980)	Identified sensitive species will be given protection in management decisions consistent with wilderness values and BLM policies.	Identified species will be given protection in management decisions consistent with BLM policies.		
—Unusual Plant Assemblages (UPAs)	Identified UPAs will be given protection in management decisions consistent with wilderness values and BLM policies.	Identified UPAs will be considered when conducting all site-specific environmental impact analyses to minimize impact. See also Wetland/Riparian Areas guidelines.		
—Vegetation Manipulation 1. Mechanical Control	Mechanical control will not be allowed.		Mechanical control may be allowed, but only after consideration of possible impacts.	
2. Chemical Control	Aerial broadcast application of chemical controls will not be allowed.			
	Spot application will not be allowed.	Noxious weed eradication may be allowed after site-specific planning. Types and uses of pesticides, in particular herbicides, must conform to federal, state, and local regulations (see Vegetation Element).	Spot applications will be allowed after site-specific planning. Types and uses of pesticides, in particular herbicides, must conform to federal, state, and local regulations (see Vegetation Element).	
3. Exclosures	Exclosures will not be allowed.	Exclosures may be allowed.		
4. Prescribed Burning	Prescribed burning will not be allowed.	Prescribed burning may be allowed after development of a site-specific management plan.		

Appendix B-2 Bureau Of Land Management Multiple Use Class Guidelines				
Resource Uses	**Multiple-Use Class C Controlled Use (Wilderness Management)*** (Note: Class C identifies areas (preliminarily) recommended for wilderness designation by Congress. These guidelines summarize the kinds of management likely to be used in these areas after formal designation of wilderness by Congress)	**Multiple-Use Class L Limited Use**	**Multiple-Use Class M Moderate Use**	**Multiple-Use Class I Intensive Use**
11. Land Tenure Adjustment	Lands will be acquired through exchange, purchase, or other means in accordance with FLPMA and other applicable federal laws and regulations, to assure more efficient management of the public lands and to reduce conflicts with other public and private landowners to provide more consistency and logic in desertwide land-use patterns.			
	Public lands will not be sold.		Sales of public lands may be allowed in accordance with FLPMA and other applicable Federal laws and regulations. Sales in WSAs will not be allowed until after Congressional action.	Public lands will not be sold. NOTE: Sales of public lands may be permitted in unclassified lands.
12. Livestock Grazing	Grazing will be allowed subject to limitations to preserve wilderness characteristics and the protection of sensitive resources, except that existing grazing will only be subject to the protection of sensitive resources.	Grazing will be allowed subject to the protection of sensitive resources.		
	Major support facilities, such as permanent corrals, loading chutes, and significant water developments, will not be allowed except for existing facilities pursuant to valid existing leases, licenses, and permits. Maintenance of such facilities will be controlled to prevent unnecessary or undue degradation of wilderness values.	Support facilities such as corrals, loading chutes, water developments, and other facilities, permanent or temporary, may be allowed consistent with protection of sensitive resources.	Support facilities such as corrals, loading chutes, water developments, and other facilities, permanent or temporary, will be allowed.	
	Manipulation of vegetation by chemical or mechanical means will not be allowed.	Manipulation of vegetation by chemical or mechanical means will not be allowed, except for site-specific needs. (See Vegetation Element.)	Manipulation of vegetation by chemical or mechanical means may be allowed and may be designed, developed, and managed for intensive livestock use.	

Appendix B-2 Bureau Of Land Management Multiple Use Class Guidelines				
Resource Uses	**Multiple-Use Class C Controlled Use (Wilderness Management)*** (Note: Class C identifies areas (preliminarily) recommended for wilderness designation by Congress. These guidelines summarize the kinds of management likely to be used in these areas after formal designation of wilderness by Congress)	**Multiple-Use Class L Limited Use**	**Multiple-Use Class M Moderate Use**	**Multiple-Use Class I Intensive Use**
13. Mineral Exploration and Developmcnt	These guidelines summarize the kinds of management likcly to be used after formal designation of wilderness by Congress. Congressional enactment of wilderness will prescribe mining rules and possible cutoff dates for mineral entry. The information below indicates the possible restrictions after enactment. The following summarizes possible significant provisions of the Wilderness Act as it applies to mineral exploration and development after Congress officially designates the areas as wilderness. (For more detailed information, see the G-E-M Element or the Wilderness Act of September 3, 1964). Minerals Prospecting and Exploration: Prospecting and exploration for the purpose of gathering information about mineral resources is allowed, provided such activity is carried on in a manner compatible with the	*Leasable Minerals* Except as provided in Appendix 5.4, 516 DM 6, NEPA Procedures titled "Categorical Exclusions," prior to issuing any mineral leases, an environmental assessment will be prepared on the proposed mineral leasing action. As this class is an area of significant public concern, 60 days' public comment will be provided on the EA. An EIS will be prepared if the proposal would significantly impact the quality of the human environment and this should be expected in areas of especially sensitive surface resources. Mitigation measures as appropriate, subject to technical, ecological, wildlife, vegetation, and cultural values. Prior to any operations upon mineral leases, the operator shall submit the appropriate notices or applications to BLM or the U.S. Geological Survey (USGS), as appropriate, as specified in 43 CFR 3100, 3200, 3500.	*Leasable Minerals* Except as provided in Appendix 5.4, 516 DM 6, NEPA Procedures titled "Categorical Exclusions," prior to approving any lease, notice, or application that was filed pursuant to 43 CFR 3045, 3100, 3200, 3500, and S.O. 3087, as amended, an EA will be prepared on the proposed action. Mitigation and reclamation measures will be required to protect and rehabilitate sensitive scenic, ecological, wildlife, vegetative, and cultural values.	

Appendix B-2 Bureau Of Land Management Multiple Use Class Guidelines				
Resource Uses	**Multiple-Use Class C Controlled Use (Wilderness Management)*** (Note: Class C identifies areas (preliminarily) recommended for wilderness designation by Congress. These guidelines summarize the kinds of management likely to be used in these areas after formal designation of wilderness by Congress)	**Multiple-Use Class L Limited Use**	**Multiple-Use Class M Moderate Use**	**Multiple-Use Class I Intensive Use**
	preservation of the wilderness environment. Mineral Development: All designated wilderness areas may be withdrawn from mineral entry at some time subsequent to Congressional designation. Following withdrawal, *no new mining claims* may be located, and no new permits, leases, or material sales contracts may be issued subject to deadlines established by Congress. Valid existing mining operations may continue pursuant to submission and approval of operational plans which will prevent unnecessary or undue degradation of wilderness qualities.	All applications submitted to the USGS shall be treated under existing joint BLM/USGS procedures (i.e., S.O. 2948) and other applicable regulations. Reclamation requirements are contained within these procedures. BLM will review plans of operations for potential impacts on sensitive resources identified on lands in this class. Mitigation, subject to technical and economic feasibility, will be required. *Locatable Minerals* Location of mining claims is nondiscretionary. Operations on mining claims are subject to the 43 CFR 3809 Regulations and applicable state and local law. In most instances, plans of operation shall be required and treated as specified in the above regulation. An EA shall be prepared on the proposed plans of operations. As this class is a sensitive area of public concern, a 60-day public review period shall be held on all	*Locatable Minerals* Location of mining claims is a self-initiated right under the General Mining Law. Operations on mining claims are subject to the 43 CFR 3809 Regulations, the 43 CFR 3802 Regulations in Wilderness Study Areas, and applicable State and local law. NEPA requirements will be met. BLM will review notices and plans of operations for potential impacts on sensitive resources identified on lands in this class. Mitigation, subject to technical and economic feasibility, will be required.	

Appendix B-2 Bureau Of Land Management Multiple Use Class Guidelines				
Resource Uses	**Multiple-Use Class C Controlled Use (Wilderness Management)*** (Note: Class C identifies areas (preliminarily) recommended for wilderness designation by Congress. These guidelines summarize the kinds of management likely to be used in these areas after formal designation of wilderness by Congress)	**Multiple-Use Class L Limited Use**	**Multiple-Use Class M Moderate Use**	**Multiple-Use Class I Intensive Use**
		mining and reclamation plans filed in this class. *Saleable Minerals* Except as provided in Appendix 5.4, 516 DM 6, NEPA procedures titled "Categorical Exclusions," for new sites less than 5 acres in size, an EA shall be required for all material sales locations, including sand and gravel. For new sites greater than 5 acres, or in sites less than 5 acres where the EA indicates a significant level of adverse impacts, an EIS shall be required.	*Saleable Minerals* Except as provided in Appendix 5.4, 516 DM 6, NEPA Procedures titled "Categorical Exclusions," new material sales locations, including sand and gravel sites, will require an EA.	
		Continued use of existing areas of sand and gravel extractions is allowed subject to BLM permits, as specified in 43 CFR 3600.		

Appendix B-2 Bureau Of Land Management Multiple Use Class Guidelines				
Resource Uses	**Multiple-Use Class C Controlled Use (Wilderness Management)*** (Note: Class C identifies areas (preliminarily) recommended for wilderness designation by Congress. These guidelines summarize the kinds of management likely to be used in these areas after formal designation of wilderness by Congress)	**Multiple-Use Class L Limited Use**	**Multiple-Use Class M Moderate Use**	**Multiple-Use Class I Intensive Use**
14. Motorized-Vehicle Access/Transportation	Motorized-vehicle use is generally not allowed unless provided for in individual wilderness legislation and management plans or if necessary to serve valid existing rights, and for emergency use for public safety, or protection of wilderness values.	New roads and ways may be developed under right-of-way grants or pursuant to regulations or approved plans of operation. Motorized-vehicle use will be allowed on existing routes of travel until designation of routes is accomplished. Routes will be examined and a determination made whether the route will be open, closed, or limited based on criteria in 43 CFR 8342.1.	Motorized vehicle use will be allowed on "existing" routes of travel until designation of routes is completed. Routes will be examined and a determination made whether the route will be open, closed or limited based on criteria in 43 CFR 342.1	Same as Class M. In addition, the vehicle open areas are available for unrestricted vehicle access except where specifically limited through subsequent management actions as in mining plans of operation, activity plans, ACEC plans, etc. Private land within open areas are not available for use without land owner permission and are not affected by the open area designation.
		Vehicle use on some significant dunes and dry lakebeds is be allowed (see Motorized Vehicle Access Element).		
		Periodic or seasonal closure of routes of travel may be required.		
		Access will be provided for mineral exploration and development.		
	Compliance with Executive Orders 11644 and 11989 as applied to motorized-vehicle access will be assured.			
—Railroads	No new railroads and trams will be allowed. Existing railroads and trams may be operated and maintained subject to nonimpairment of wilderness values.	Railroads and trams may be allowed to serve authorized uses if no other viable alternative is possible.	Railroads and trams may be allowed.	
—Aircraft	Aircraft facilities are not allowed.	Temporary landing strips may be allowed by permit.	Airports and landing strips may be allowed by lease subject to conformance with county or regional airport plans and FAA and DOD approval.	

Appendix B-2 Bureau Of Land Management Multiple Use Class Guidelines				
Resource Uses	**Multiple-Use Class C Controlled Use (Wilderness Management)*** (Note: Class C identifies areas (preliminarily) recommended for wilderness designation by Congress. These guidelines summarize the kinds of management likely to be used in these areas after formal designation of wilderness by Congress)	**Multiple-Use Class L Limited Use**	**Multiple-Use Class M Moderate Use**	**Multiple-Use Class I Intensive Use**
15. Recreation –Recreation Uses	This class is suitable for nonmechanical types of recreational experience which generally involve low to very low user densities. Recreational opportunities provided include, but are not limited to, the following characteristic activities: —Backpacking —Primitive, unimproved site camping —Hiking —Horseback riding —Rockhounding —Nature study and observation —Photography and painting —Rockclimbing —Spelunking —Hunting	This class is suitable for recreation which generally involves low to moderate user densities. Recreation opportunities include those permitted in Class C plus: —Land-sailing on dry lakes —Bicycling, —Noncompetitive vehicle touring and events only on "approved" routes of travel All organized vehicle events meeting the criteria of 43 CFR 8372.1-1 require a permit specifying the conditions of use; these conditions will include, but are not limited to: —Vehicle use only on approved routes, —No pitting, start-finish, or spectator areas for competitive vehicle events.	This class is suitable for a wide range of recreation activities which may involve moderate to high user densities. Recreational opportunities include, but are not limited to, those permitted in Class L. All organized events meeting the criteria of 43 CFR 8372.1-1 require a permit specifying the conditions of use; these conditions will include, but are not limited to: —Vehicle use only on approved routes, —Authorization for pit, start-finish, and spectator areas for competitive vehicle events.	This class is suitable for recreation activities which generally involve high user densities. Recreational opportunities include those allowed in Class M. In addition, motorized vehicle play is allowed where approved in areas designated as "open." All organized events meeting the criteria of 43 CFR 8372.1-1 require a permit specifying conditions of use.

Appendix B-2 Bureau Of Land Management Multiple Use Class Guidelines				
Resource Uses	**Multiple-Use Class C Controlled Use (Wilderness Management)*** (Note: Class C identifies areas (preliminarily) recommended for wilderness designation by Congress. These guidelines summarize the kinds of management likely to be used in these areas after formal designation of wilderness by Congress)	**Multiple-Use Class L Limited Use**	**Multiple-Use Class M Moderate Use**	**Multiple-Use Class I Intensive Use**
—Recreation Facilities	Permanent or temporary facilities for resource protection and public health and safety may be allowed at the discretion of authorized officer or in accordance with approved Wilderness Management Plans.	Permanent or temporary facilities for resource protection and public health and safety are allowed.		
—Trails	Trails are open for nonvehicular use and new trails for nonmotorized access may be allowed.			
16. Waste Disposal	Waste disposal sites will not be allowed in this class.	Public lands managed by BLM may not be used for waste disposal, either hazardous or non-hazardous.	Public lands managed by BLM may not be used for waste disposal, either hazardous or nonhazardous. Where locations suitable for disposal are found on BLM-managed lands, consideration will be given to transfer of such sites through sale or exchange to other ownership for this use.	
17. Wildlife Species and Habitat, Rare, Threatened, and Endangered Species (Both State and Federal)	All state and federally listed species and their critical habitat will be fully protected. Actions which may affect or jeopardize the continued existence of federally listed species will require formal consultation with the U.S. Fish and Wildlife Service in accordance with Section 7 of the Endangered Species Act.			
—Sensitive Species	Identified sensitive species will be given protection in management decisions consistent with wilderness values and BLM policies.	Identified species will be given protection in management decisions consistent with BLM policies.		
—Predator and Pest Control	Predator and pest control will not be allowed except to alleviate public health hazards or to protect endangered species.	Control of depredating wildlife and pests will be allowed in accordance with existing state and federal laws.		
—Habitat Manipulation	Projects to improve wildlife habitat may be allowed subject to environmental assessment.		Same as Classes C and L, except that chemical and mechanical vegetation manipulation may be allowed.	
—Reintroduction or Introduction of Established Exotic Species	Reintroduction of native species is allowed.	Reintroduction or introduction of native species or established exotic species is allowed.		
18. Wetland/Riparian Areas	Wetland/riparian areas will be considered in all proposed land-use actions. Steps will be taken to provide that these unique characteristics and ecological requirements are managed in accordance with Executive Order 11990. Protection of Wetlands (42 CFR 26951), legislative and Secretarial			

Appendix B-2 Bureau Of Land Management Multiple Use Class Guidelines				
Resource Uses	**Multiple-Use Class C Controlled Use (Wilderness Management)*** (Note: Class C identifies areas (preliminarily) recommended for wilderness designation by Congress. These guidelines summarize the kinds of management likely to be used in these areas after formal designation of wilderness by Congress)	**Multiple-Use Class L Limited Use**	**Multiple-Use Class M Moderate Use**	**Multiple-Use Class I Intensive Use**
	direction, and BLM Manual 6740, "Wetland-Riparian Area Protection and Management" (October 1, 1979), as outlined in the Vegetation Element.			
19. Wild Horses and Burros	Populations of wild and free-roaming horses and burros will be maintained in accordance with the Wild and Free-Roaming Horse and Burro Act of 1971 but will be subject to controls to protect sensitive resources as provided for in management plans for wilderness areas. (See Wild Horse and Burro Element.)	Populations of wild and free-roaming horses and burros will be maintained in healthy, stable herds, in accordance with the Wild and Free-Roaming Horse and Burro Act of 1971 but will be subject to controls to protect sensitive resources. (See Wild Horse and Burro Element.)		

Appendix B-3
IBLA Stay

United States Department of the Interior

OFFICE OF HEARINGS AND APPEALS
INTERIOR BOARD OF LAND APPEALS
4015 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22203

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

JAN - 4 1994

IBLA 94-89, etc.	:	CACA-25594, CACA-31926, CACA-30070
	:	
EAGLE MOUNTAIN ENERGY CO., ET AL., Appellants	:	Rights-of-way; Land Exchange
	:	Requests for Consolidation,
KAISER EAGLE MOUNTAIN, INC.,	:	Hearing, and Dismissal Taken
MINE RECLAMATION CORP.,	:	Under Advisement;
METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA	:	Expedited Consideration Granted;
	:	Stay Granted in Part;
Intervenors/Respondents	:	Briefing Schedule Established

ORDER

On October 20, 1993, the California Desert District Office (CDDO), Bureau of Land Management (BLM), issued a decision approving a land exchange (CACA-30070) and granting two rights-of-way (CACA-25594 and CACA-31926). At the same time, the California State Office (CSO), BLM, denied numerous protests that had been filed in opposition to the proposed realty actions. 1/

The principal recipient of CDDO's decision is Kaiser Eagle Mountain, Inc. (Kaiser). Further, one of the right-of-way grants (CACA-31926) is to be held jointly by Kaiser and the Metropolitan Water District of Southern California (MWD). BLM found the exchange and rights-of-way to be necessary for the development of a large municipal landfill located at the site of Kaiser's inactive open pit iron ore mine at Eagle Mountain in Riverside County, California. The solid waste landfill at the site is to be operated by Mine Reclamation Corp. (MRC). Sixteen notices of appeal from CSO's decisions denying protests have been filed. 2/

Under 43 CFR 4.413, BLM is obliged to name in its decisions all "adverse parties." An "adverse party" to an appeal is one who will be disadvantaged if the appellant prevails before the Board. Beard Oil Co., 105 IBLA 285, 287 (1988). Appellants are required to serve copies of all appeal documents on such adverse parties, and each adverse party has the right to file an answer in support of the correctness of BLM's decision. See 43 CFR 4.413(a) and 4.414. Naturally, in order to file a responsive answer, each adverse party must receive a copy of the statement of reasons filed by each appellant.

1/ BLM recites in its response to appellants' petitions for stay that it mailed "[o]ver 350 copies of the [record of decision (ROD)] with letters from the [California] State Director dismissing protests to the Notice of Realty Action."

2/ Appellants' names and the docket numbers that have been assigned to their appeals are set out in the Appendix attached to this order.

BLM did notify all prospective appellants of their obligation to submit "copies of the notice of appeal and petition for a stay" on Kaiser, MWD, and MRC, as parties "named in Section 1.0" of BLM's record of decision. Unfortunately, however, BLM neither expressly identified Kaiser, MWD, and MRC as "adverse parties" nor otherwise advised prospective appellants of their obligation to file copies of their statements of reasons on them. Thus, appellants may not be aware of their obligation to serve copies of their statements of reasons on Kaiser, MWD, and MRC. All appellants are directed to serve copies of their statements of reasons on Kaiser, MWD, and MRC, if they have not already done so.

BLM's failure to expressly name Kaiser, MWD, or MRC as "adverse parties" does not prevent them from participating in this appeal, however, as it is well established that a party having an interest in an appeal may be allowed to intervene as a respondent. See, e.g., Lloyd Heger, 121 IBLA 321, 324 (1991); Beard Oil Co., supra at 287. Kaiser and MRC, through common counsel, have filed an appearance, and they are recognized as respondents. MWD has also requested leave to intervene, and it too is recognized as a respondent.

BLM, Kaiser, and MRC have requested expedited consideration of the appeals. That request is granted.

Various parties have requested that the appeals be consolidated, and those requests are taken under advisement. However, respondents may file a single answer to the various statements of reasons. As noted above, respondents Kaiser and MRC are represented by common counsel, and it may be anticipated that they will file a joint answer to the various statements of reasons. MWD and BLM will likely file individual answers. Respondents are directed to serve copies of their answers on all appellants.

Kaiser and MRC allege that only EMEC and Donna Charpied have standing to appeal in this case, and they request that the appeals of all other appellants be dismissed. EMEC has requested a hearing. Those requests are also taken under advisement.

Requests for stay of BLM's decision pending consideration by this Board of those appeals have also been filed by all appellants. Respondents have opposed those requests; BLM and MWD have opposed the request insofar as it concerns the rights-of-way.

We are persuaded that a stay should be granted of the decision to approve the land exchange. Under 43 CFR 4.21(b), 58 FR 4943 (Jan. 19, 1993), an appellant who requests a stay of such a decision bears the burden of proof to demonstrate sufficient justification for the granting of a stay based on the following standards:

> (i) The relative harm to the parties if the stay is granted or denied,

(ii) The likelihood of the appellant's success on the merits,

(iii) The likelihood of immediate and irreparable harm if the stay is not granted, and

(iv) Whether the public interest favors granting the stay.

The relative harm of denying the stay unfairly disadvantages appellants, and they may suffer immediate and irreparable harm if the stay is not granted. The correctness of BLM's decision to approve the land exchange might be insulated from administrative review if it is allowed to proceed, such that patent to the exchanged lands is issued. Improper issuance of patent, although immune from Board review, would be subject to correction by the judiciary. Nevertheless, effectively barring administrative review would unjustifiably increase the expense to appellants of seeking redress from such agency action. Thus, the public interest favors granting the stay. Finally, there are serious, substantial, difficult, and doubtful questions about the land exchange. Such questions are fair ground for litigation. In these circumstances, the standard concerning likelihood of success on the merits is satisfied. Tri-State Generation and Transmission Ass'n, Inc. v. Shoshone River Power, Inc., 805 F.2d 351, 358 (10th Cir. 1986); Hamilton Watch Co. v. Benrus Watch Co., 206 F.2d 738, 740 (2d Cir. 1953); Sierra Club, 108 IBLA 381, 384-85 (1989).

The regulation at 43 CFR 4.21(a) (58 FR 4942-43 (Jan. 19, 1993)) controls the effect of decisions pending appeal "[e]xcept as otherwise provided by law or other pertinent regulation." The regulations governing rights-of-way, 43 CFR Part 2800, do contain a "pertinent regulation" that meets the exception of 43 CFR 4.21(a). Under 43 CFR 2804.1(b), all decisions of the authorized officer under 43 CFR Part 2800 "shall remain effective pending appeal." Therefore, 43 CFR 4.21(a) does not apply to the rights-of-way decisions in this case, and the provisions of that section relating to the filing of petitions for stay are inapplicable. Cf. Michael Blake, 127 IBLA 109, 110 (1993) (43 CFR 4.21(a) does not apply to decisions to remove wild horses or burros from public lands because 43 CFR 4770.3(c) contains a specific provision governing the effect of such decisions); In re Eastside Salvage Timber Sale, 128 IBLA 114 (1993) (43 CFR 4.21(a) does not apply to timber sale decisions under 43 CFR Part 5000 because that part contains a "pertinent regulation" that meets the exception of 43 CFR 4.21(a)). However, 43 CFR 2804.1(b) does provide for the filing of petitions for stay and directs that they be filed with the Office of Hearings and Appeals, Department of the Interior.

Although 43 CFR 4.21 is not applicable in this case, the standards set out in 43 CFR 4.21(b) for judging a petition for stay are essentially those that have long been recognized and applied by this Board in determining whether to grant a stay. See Jan Wroncy, 124 IBLA 150, 152 (1992); High Desert Communications, Inc., 123 IBLA 20, 23-24 (1992); Marathon Oil Co.,

90 IBLA 236, 245-46, 93 I.D. 6, 11-12 (1986). 3/ The party requesting the stay bears the burden of proof to demonstrate that a stay should be granted.

Appellants have failed to show that a stay of the decision granting the rights-of-way is necessary. BLM alleges that issuance of the two rights-of-way will not result in any immediate or irreparable harm in either case, because right-of-way CACA-25594 essentially replaces an existing pre-Federal Land Policy and Management Act right-of-way grant (CALA-0121701), and that issuance of a stay would merely suspend the new right-of-way but leave intact the existing right-of-way. Further, BLM claims that the other right-of-way (CACA-31926) is presently a county road which is to be abandoned by Riverside County, and that granting a stay will allow continued use as a county road. Finally, BLM points out that no new activities may take place on the rights-of-way without a Notice to Proceed being issued, and no trash can be hauled on the rights-of-way without completion of the exchange. In the meantime, if the rights-of-way are effective, BLM may collect rental for them. MWD asserts that invalidating right-of-way CACA-31926 would impair its access to its Eagle Mountain pumping station and impair its ability to operate the Colorado River Aqueduct. The public interest clearly weighs in favor of denying the stay of the decision granting the rights-of-way in these circumstances.

Owing to the diverse filing of statements of reasons by the sixteen appellants here, we deem it appropriate to establish a briefing schedule that will allow respondents to file a single answer under 43 CFR 4.413, as discussed above. The time during which statements of reasons for some appellants may be filed extends through and including January 7, 1994. Allowing for possible delays in serving copies of all statements of reasons on respondents and BLM, they are allowed through and including February 11, 1994, to file their answers. Appellants shall then have 15 days from receipt of those answers to file responsive pleadings, if they wish to do so. The parties are advised that extensions of time will be granted only in extraordinary circumstances.

David L. Hughes
Administrative Judge

I concur:

Bruce R. Harris
Deputy Chief Administrative Judge

3/ The standards, as set forth in Wroncy, 124 IBLA at 152, are likelihood of success on the merits, threat of irreparable injury to the moving party if the stay is not granted, whether the threatened injury to the moving party outweighs the potential harm the stay may cause to the nonmoving party, and whether the stay is contrary to the public interest.

APPEARANCES:

For Eagle Mountain Energy Company:

Jose R. Allen, Esq.
Jane B. Kroesche, Esq.
Skadden, Arps, Slalte, Meagher & Flom
Four Embarcadero Center
San Francisco, CA 94111-4144

For himself:

John Bromley
76536 Hollyhock Drive
Palm Desert, CA 92211

For himself:

Richard M. Marsh
81557 Dr. Carreon Blvd., Suite A-3
Indio, CA 92201

For themselves:

Will Virgil Blanton
Dorothy J. Blanton
34-604 Stage Drive
Thousand Palms, CA 92276

For Steve Clute, et al.:

Melanie Fesmire, Esq.
Fesmire & Williams
81-701 Highway 111
Indio, CA 92202

For herself:

Donna Charpied
P.O. Box 321
Desert Center, CA 92239

For Joseph A. Roman, et al.:

Joseph A. Roman, Esq.
2825 East Tahquitz Canyon Way, Suite D-1
Palm Springs, CA 92262

For Larry Charpied:

Lawrence A. McHenry, Esq.
821 South 15th Avenue
Phoenix, Arizona 85007

For Citizens for the Chuckwalla Valley

Julie Smiley
Secretary of Citizens for the Chuckwalla Valley
P.O. Box 397
Desert Center, CA 92239

For themselves:

Desert Citizens Against Pollution
3818 50th Street West
Rosamond, CA 93560

For himself:

Robert J. Reistroffer
26250 Parkview #63
Desert Center, CA 92239

For herself:

Mrs. R. Reistroffer
P.O. Box 652
Desert Center, CA 92239

For himself:

Frank C. Nichols
1220 Via Donna
Palm Springs, CA 92262

For themselves:

Julianne Toenjes
Carolyn R. Toenjes
H. R. Toenjes
1863 Park Drive
Palm Springs, CA 92262

For Kaiser Eagle Mountain, Inc., and Mine Reclamation Corp.:

Paul T. Seltzer, Esq.
Sharyl Walker, Esq.
Robert W. Hargreaves, Esq.
Best, Best & Krieger
P. O. Box 2710
Palm Springs, CA 92263-2710

For the Metropolitan Water District of Southern California:

Victor Gleason, Esq., et al.
The Metropolitan Water District of Southern California
350 South Central Avenue
P.O. Box 54153
Los Angeles, CA 90071

For the Bureau of Land Management:

Al Wright
California State Office
Bureau of Land Management
2800 Cottage Way, Room E-2845
Sacramento, CA 95825-1889

cc: California Desert District Office, BLM

APPENDIX

IBLA	APPELLANT
94-0089	Eagle Mountain Energy Company
94-0090	John Bromley
94-0091	Richard M. Marsh
94-0092	Will Virgil Blanton et ux.
94-0093	Steve Clute, et al.
94-0094	Donna Charpied
94-0151	Joseph A. Roman, et al.
94-0152	Larry Charpied
94-0153	Citizens for the Chuckwalla Valley
94-0154	Desert Citizens Against Pollution
94-0155	Robert J. Reistroffer
94-0156	Mrs. R. Reistroffer
94-0157	Frank C. Nichols
94-0158	Julianne Toenjes
94-0159	Carolyn R. Toenjes
94-0160	H. R. Toenjes

Appendix B-4
Bid Sheets

Landfill Proposal Summary / November 30, 1995

	Rabonco/BLT	*La Paz Co./BFI*	*San Bernardino Co.*	*WMX*	*RCWRMD*	*Eagle Mt.*	*Sanafill, AZ*
Landfill Name	Frank Bowerman Landfill/Olinda Alpha Landfill	La Paz County Landfill	Landers Landfill (Twenty-nine Palms Landfill as backup)	Lancaster Landfill OR Butterfield Station	Badlands Landfill	Eagle Mountain Landfill	Copper Mountain Landfill
Location	Tustin, CA Brea, CA	18 miles southeast of Parker, AZ	Landers, CA (30 miles north of Desert Hot Springs)	Lancaster, CA. or Mobile, AZ.	Riverside County north of I-60 at Theodore Street	Eastern Riverside County, 60 miles east of Indio	35 miles east of Yuma, AZ. (approx. 170 miles one way)
Jurisdiction Approval	Yes. Letter from Orange County enclosed	Yes. La Paz County is partner in this proposal	Yes. San Bernardino Co. owns the site	Proposal states none needed	Operating permit would need to be revised - should take approx. 4 months	Permit will be issued by Riverside County	None required according to proposal
Operating Now?	Yes	Yes	Yes	Yes Yes	Yes	No	Operations to begin December 1995
Permit Status	Permitted & operating	Permitted & operating	Permitted & operating	Both permitted & operating	Permitted & Operating	EIR in process now, still must receive permits	Received all operating permits as of 9/20/95
Tipping Fees 5 year 10 year 15 year	$36.53/ton* $36.53/ton* $36.53/ton* *includes haul to site from transfer station.	$17-18.25/ton $16-17.25/ton $15-16.25/ton	$35.50/ton is current tipping fee. County expects "significant reduction" in spring 1996 and would like to submit reduced tipping fee at that time.	$18.25-29.25/ton $18.15-28.00/ton $18.00-26.50/ton OR $30.50-43.00/ton at Butterfield includes rail haul (see comments below)	$28.27/ton $25.25/ton $24.50/ton	$19.05-22.25/ton $18.55-21.75/ton $18.05-21.25/ton	$14.75-16.50/ton $14.50-16.25/ton $14.25-16.00/ton
Contract Exceptions	None	Requests refine CERCLA indemnification language. Objects to transfer of capacity to non-CVAG jurisdictions	None	None	For CERCLA indemnification must operate load check program/no absolute right to transfer capacity/no performance bond	Must limit capacity transfer to cities in Riverside County or tip fees increase	None
Additional Info Needed	Need info on landfill operations (Forms 14, 6, 17, 18, 19, 20)	Missing text at bottom of page 8-1.	Need additional tipping fee info.	Confirm no jurisdictional approval needed	Determine what tip fee reduction for transfer trailers is proposed	Need to confirm schedule for permitting & any potential opposition	Need to confirm no additional permits required
Comments	Proposal includes haul & tip fee @ landfills. Landfills operated by Orange Co. If operator of transfer station hauls waste to site and Orange Co. operates site, unclear what proposer would provide.	City of Escondido now using site. Also many local businesses. Site is lined.	San Bernardino Co. contracts with Norcal for operation of its landfills. County is asking San Bernardino County cities to sign waste flow commitments to bring waste to County landfills.	Lancaster can accept 500 tpd now. After expansion planned for 1997 could accept 1500 tpd. Butterfield can accept 1500 tpd now. WMX estimates adding rail facilities costs $2.6 million. Butterfield is lined.	District willing to commit 2.5 million tons to CVAG jurisdictions. Proposal speaks about providing 166,500 tpy. Proposal states tip fee may be reduced by Board for transfer trailers.	MRC has no operating experience however proposal includes letters of interest from Norcal and Sanafill to perform site operation once landfill receives permits. Site will be lined	Site is brand new and lined. Sanafill has operating experience since 1990. (It specializes in landfill operations (both hazardous & MSW landfills)

Appendix B-5
Construction Considerations

Appendix B-5
Construction Considerations

Construction Quality Assurance. A comprehensive construction quality assurance (CQA) program will be implemented during construction as required in the previously issued Waste Discharge Requirements for this landfill. The CQA program is briefly described in Section 2.1.6.1 of this document. Implementation of the CQA program provides an assurance that the various elements of the landfill are constructed as specified in the design. Items such as material types and characteristics, interface strength values, and confirmation of material placement conditions will be confirmed and documented by CQA personnel.

Grading. Each subphase of the landfill site will be graded after the RWQCB approves the construction plans and specifications. Grading serves as an initial step in construction of the liner system and is intended to provide a firm, stable subgrade capable of supporting landfill structures, as required by §2530.(d) of the CCR, Chapter 15. Landfill grading activities will include: (1) clearing and grubbing, (2) excavation to achieve design foundation grade elevations, (3) subgrade preparation, and (4) placement of engineered fill. Grading and site preparation details are described in Section 6 of the ROWD (GeoSyntec, 1992).

Materials that are inappropriate for construction, and that would not provide suitable support of landfill structures, will be cleared, grubbed, and isolated. Inappropriate materials include vegetation, man-made debris and structures, and organic materials.

Excavations will be performed to achieve the foundation grade elevations and to reach firm subgrade materials. Materials to be excavated will range from loose soils to very hard bedrock. Excavation through the use of controlled blasting will be required in some hard bedrock areas of the landfill. The majority of the existing soil and rock materials present at the landfill site will be reusable as engineered fill. Engineered fill will be placed: (1) to achieve the design foundation elevations and contours (grades); (2) to provide a smooth, stable surface for construction of the landfill; and (3) as components of the landfill liner, cover systems, or surface water management systems.

Blasting will be used in some hard bedrock areas of rough grading to prepare the subgrade for fill placement before liner system construction. The volume of material to be blasted varies depending on location and condition of the existing ground conditions. The purpose of the blasting is to achieve design subgrade elevations by shaping or flattening existing ground surfaces so that they are suitable for placing fill in preparation of receiving the liner materials. The blasting will be kept to a minimum. The explosive charges will be designed with time delays to control the blast and minimize ground vibration effects. Most blasting activities will be completed prior to any nearby liner system construction such that completed sections of the liner system are not close enough to be damaged by vibration, air blast, airborne fragments (projectiles), rock falls, or rock slides. To assure that proper safety precautions are implemented, the blasting specifications for each new subphase of development will include general and site-specific protocols for blasting to protect workers and environmental control

systems. The protocols will establish methods of warning personnel of a blasting event and set standards for personnel to remain at a safe distance and remain under cover until an "all clear" signal is given. If environmental control systems are in close proximity to an impending blast, the protocol will require that the work be protected with cover prior to the blasting and checked by CQA personnel to confirm the absence of blast-induced damage and to identify any need for post-blast repairs. Monitoring instruments for air blast and vibrations (particle velocity) will be used to check that damage thresholds (for liner system and LCRS) are not exceeded.

Slope areas characterized as having adverse geologic conditions (e.g., fracture zones, out-of-slope bedding, or other geologic discontinuities) identified during mapping associated with construction-level geologic investigations will be remediated during site grading as necessary. Remedial measures may include scaling (removal) of potentially unstable rock zones or stabilization using either structural measures (e.g., rock bolts, soil nailing, or ground anchors) or earthfill.

Foundation areas identified as having potentially adverse compressible and collapsible soils during the subphase-specific, construction-level design investigations will receive special attention during grading. The compressible or collapsible soils will be removed and replaced with engineered fill to prepare a suitable foundation for the landfill liner system. The engineered fill tends to distribute the effects of settlement of underlying natural soils thereby reducing the potential for differential settlement impacts on the landfill containment system.

Final grading will be performed as part of the closure activities. Final waste layers will be placed to achieve the design final grade elevations prior to the placement of the final cover and final surface water drainage controls.

Liner System Constructability. The types of components proposed for the liner system at the Eagle Mountain Landfill have all been used in similar applications at Subtitle D compliant facilities across the United States. Therefore, the construction experience and methods necessary for successful liner system construction are common and readily available. In an effort to provide the reader with a better understanding of the liner system construction, the placement of several liner system elements is described below.

The low-permeability soil liner component of the bottom composite liner will be placed on a geotextile filter material that overlies the coarse-grained material of the unsaturated zone liquid monitoring system (UZLMS). Successful placement and compaction of the first lift of the soil liner is important for proper liner construction. The construction specifications that will be developed during detailed design of each subphase will require the construction contractor to demonstrate (through construction of test pads) their proposed technique for achieving the specified compaction using compaction equipment that will not damage the underlying UZLMS. This demonstration will need to be made to the satisfaction of the design engineer, appropriate regulatory authorities, and the CQA manager. The specifications will alert the contractor that it may be necessary to place an additional thickness of clay liner material to meet the specified minimum thickness (i.e., 24 in.) of material having a hydraulic conductivity of not more than 1×10^{-7} cm/s.

Another important liner system construction item is the preparation of the surface upon which the sideslope geosynthetic clay liner (GCL) will be installed. The construction specifications will provide detailed requirements for preparing the surface upon which the sideslope GCL will be placed. These requirements will include trimming the slope surface with a smooth-bladed excavator bucket or other suitable construction equipment, removing oversized rock and any sharp objects by raking or other means, and, if necessary to obtain an adequately smooth surface for GCL installation, smooth rolling of the surface. The construction specifications will also include a contingency plan in the event that difficulties are encountered in preparing the slope surface or deploying the GCL or geomembrane. It should be noted that liner system installation of the type proposed for the Eagle Mountain Landfill is relatively common in Southern California. Examples include the Puente Hills, Lopez Canyon, Azusa, and Bradley West landfills. As a result of their experiences at these and other landfills, Southern California contractors have developed specific methods for sideslope liner system construction.

GCL installation on the landfill sideslopes will be conducted from the liner system benches. Each GCL roll will be transported to the appropriate location on the benches using an all-terrain forklift equipped with a stinger, or other suitable equipment. Once positioned, vice grips with rope leads will be attached to the leading edge of the GCL. Workers at the base of the sideslope increment being constructed will pull the leading edge of the GCL down the slope using the vice grips and rope leads. Once in place, the GCL will be temporarily secured in the anchor trench using sand bags and the back edge of the GCL will then be cut using a hand-held hook blade. The forklift will then be moved forward to install the next, adjacent strip of GCL.

Adjacent GCL strips will be installed with a 6-inch overlap. Given the relatively dry nature of the subgrade upon which the GCL will be laid, the absence of free water at the subgrade GCL interface, and the level of watertightness provided by the overlaps for this type of GCL, there is no need to seam the geomembrane backing components of adjacent GCL strips.

The contractor's ability to place leachate collection and removal system (LCRS) gravel against the sideslope liner system, on top of the base liner, and in drainage corridors without damaging the underlying liner system is briefly described. The construction specifications will provide detailed requirements for construction of the LCRS to prevent damage to the underlying liner system. On the sideslope, the LCRS can either be placed in horizontal lifts, overbuilt and cut back, or placed with an excavator bucket extending from the base of the landfill. These techniques would reduce the need for equipment to travel up onto the slopes during LCRS placement. Also, the design of the Eagle Mountain Landfill includes a geotextile cushion layer above the HDPE geomembrane component of the liner system. The cushion is specifically designed using laboratory test data to prevent puncture of the HDPE geomembrane by LCRS gravel (GeoSyntec, 1992). The Eagle Mountain Landfill ROWD (i.e., Section 7.9.2.2) contains the results of tests that were performed to confirm that the selected geotextile cushion will provide protection against puncture under the anticipated loads and with the anticipated materials. The construction specifications will contain additional requirements designed to protect the liner system during LCRS construction. These include, for example, limitations as the ground pressure applied by equipment used to

construct the LCRS and both acceptable and prohibited procedures for placing the LCRS material on top of the geotextile cushion.

The on-site CQA representatives will observe all landfill construction activities, including installation of all liner system components. The CQA program will be developed in accordance with the industry-standard guidance given in the USEPA Technical Guidance Document "Quality Assurance and Quality Control for Waste Containment Facilities," September 1993, EPA/600/R-93/182. The CQA program will be included in each subphase-specific construction plans and specifications package submitted to the RWQCB for review and approval prior to the start of construction activities in that subphase.

Construction Personnel Safety Considerations. Landfill liners have been safely constructed at many landfills, including Lopez Canyon Landfill, which also included a GCL and geomembrane. The contractor will be required to develop a comprehensive Health and Safety Plan and other operational plans prior to commencing construction. The Health and Safety Plan will address all construction aspects, including blasting. Public health and safety issues, including those for construction personnel, are discussed in Sections 3.2 and 4.2 of the EIS/EIR.

Appendix C
Updated Groundwater Analysis

C-1 Technical Memorandum
C-2 Technical Advisory Panel Report
C-3 Reliability and Performance of Engineered Groundwater Protection Systems Report
C-4 Groundwater Investigation and Monitoring Summary Report
C-5 The Potential for Gas Generation and Leachate Production at the Proposed Eagle Mountain Landfill

Appendix C-1
Technical Memorandum

Appendix C1

Technical Memorandum

Elaboration on Specific Hydrogeological Concepts Discussed in the Eagle Mountain Landfill and Recycling Center Environmental Impact Study/Environmental Impact Report

Prepared by
CH2M HILL

July 1996

Contents

Introduction C1-3
Groundwater Affected Environment C1-3
Bedrock Aquifer C1-3
Bedrock Composition C1-5
Fracture Sets C1-5
Fracture Density C1-5
Porous-Media Equivalency C1-6
Groundwater Occurrence in the Bedrock C1-6
General Characteristics C1-6
Groundwater Levels C1-9
Hydraulic Properties of the Bedrock Aquifer C1-14
Hydraulic Conductivity C1-14
Groundwater in Storage C1-19
Groundwater Flow in the Bedrock Aquifer C1-19
General Flow Directions C1-19
Groundwater Velocity C1-21
Bedrock Aquifer Recharge C1-21
Chuckwalla Aquifer C1-21
Physical Setting C1-21
Aquifer Composition C1-23
Regional Groundwater Flow C1-23
Aquifer Recharge C1-25
Environmental Consequences C1-26
Significance Threshold Criteria C1-26
Groundwater Quality Significance Criteria C1-26
State Water-Quality Requirements C1-26
Federal Water-Quality Requirements C1-27
Groundwater-Quality Criteria for the Project C1-27
Groundwater Use Significance Criteria C1-27
Groundwater Depletion C1-28
Water-Level Decline in Non-Project Wells C1-28
Overdraft C1-30
Interference with Groundwater Recharge C1-30
Encouragement of Activities that Use Large Amounts of Water C1-31
Wasteful Use of Water C1-32
Ground-Surface Subsidence C1-32
Groundwater Travel Time from Project Site to the Colorado River C1-32
Analysis of Water-Level Decline in Local Wells C1-34

Tables

C1-1 Static Water-Level Elevation C1-10
C1-2 Hydraulic Conductivity of the Bedrock Aquifer at the Project Site C1-19
C1-3 Areal Distribution of Hydraulic Conductivity Obtained From Packer Tests and Detailed Fracture Analysis C1-20
C1-4 Principal Parameters and Values Used in the Approximation of Groundwater Level Declines in the Western Chuckwalla Aquifer C1-36
C1-5 Results of Approximations of Groundwater Level Declines C1-38

Figures

C1-1 Chuckwalla Valley Groundwater Basin C1-4
C1-2 Groundwater Monitoring Points in the Vicinity of the Project Site C1-8
C1-3 Groundwater-Surface Elevations in the Vicinity of the Project Site C1-13
C1-4 North-South Cross Sections through the Proposed Landfill Footprint C1-15
C1-5 East-West Cross Section through the Proposed Landfill Footprint C1-17
C1-6 Groundwater Basins in Southern California C1-22
C1-7 Groundwater Surface Elevations in the Chuckwalla Basin C1-24
C1-8 Schematic Representation of Standard of Significance for Water-Level Decline in an Existing Well C1-29
C1-9 Regional Groundwater Flow and Proposed Project Site Relative to the Colorado River and the Salton Sea C1-33
C1-10 Location of Project Wells and Closest Non-Project Water Well Supply C1-37

Introduction

This Technical Memorandum (TM) presents supporting information for hydrogeological concepts introduced in Sections 3.1 and 4.1(*Groundwater Quality and Use*) of the Eagle Mountain Landfill and Recycling Center Environmental Impact Statement and Environmental Impact Report (EIS/EIR).

During the planning phases of the proposed landfill and recycling center (the proposed Project), several hydrogeological investigations were conducted in support of both the previous EIS/EIR (BLM and County of Riverside, 1992) and related operational permit requirements. Consequently, several technical reports have been prepared that document the various investigations, present field data, and describe the prevailing hydrogeological conditions at the Project site. Most of these reports have been embodied in the Report of Waste Discharge (ROWD) (GeoSyntec, 1992) and its companion supplemental volumes (GeoSyntec, 1993a; GeoSyntec, 1993b). A summary of the principal findings of the ROWD and the proposed groundwater monitoring program for the landfill is presented in GeoSyntec (1996).

The hydrogeological concepts addressed in this TM are generally limited to those in which this appendix is specifically cited in the EIS/EIR as a source of further information or clarification. Topics are discussed in the same general order that they are introduced in the EIS/EIR, with concepts in Section 3.1 (*Affected Environment*) presented first followed by those in Section 4.1 (*Environmental Consequences*).

Groundwater Affected Environment

The proposed landfill is situated in the Eagle Mountains at the edge of the northwestern extension of the Chuckwalla Valley Groundwater Basin (Chuckwalla Basin) (Figure C1-1). The Project site as a whole (i.e., the landfill, support facilities, and the Townsite), however, extends more than a mile onto the basin floor, and the existing wells that will serve the proposed Project are located approximately 4 miles further east into the basin. As a result, two principal aquifers are identified to distinguish between the two general types of groundwater environments that occur in the vicinity of the Project site: (1) within the bedrock of the Eagle Mountains (bedrock aquifer) and (2) within the saturated alluvium of the Chuckwalla Basin (Chuckwalla aquifer). Although identified as separate or discrete features, site-specific data, discussed below, indicate that these two aquifers are hydraulically interconnected.

Bedrock Aquifer

At most locations within the Project site, the water table occurs in bedrock, which, within the Project site, is typically either exposed or overlain by a layer of unsaturated alluvium or piles of mining by-products.

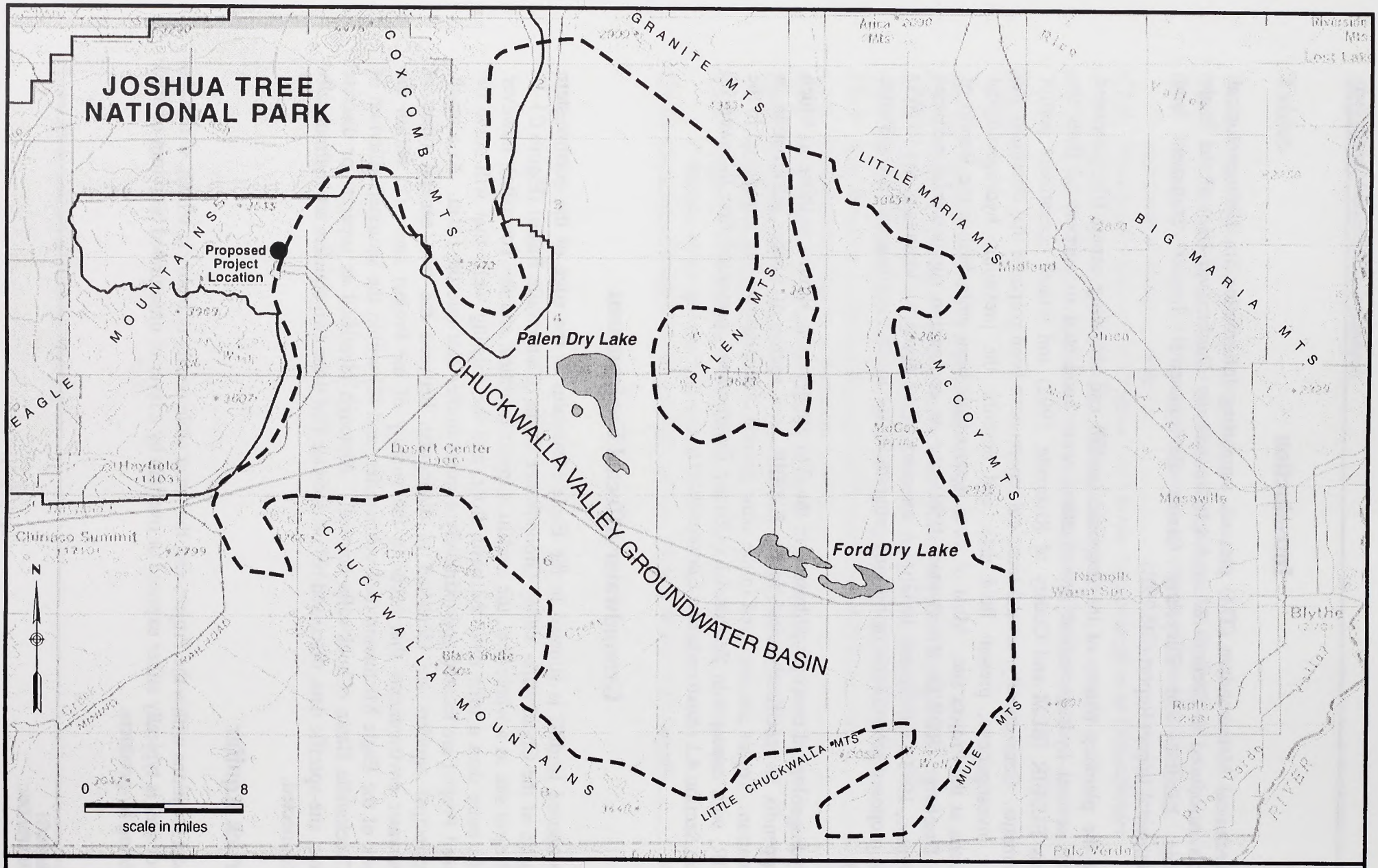


Figure C1-1
Chuckwalla Valley Groundwater Basin
Eagle Mountain Landfill and Recycling Center EIS/EIR

CH2M HILL

m115231.T6.20 14 6/96

Bedrock Composition

The bedrock underlying the Project site consists of Paleozoic metasedimentary rocks and Mesozoic igneous rocks. The principal metasedimentary rocks are quartzite, meta-arkose, and marble. The intrusive igneous rocks include sills, dikes, and irregular bodies of porphyritic quartz, diorite, monzonite, granodiorite, and granite. Structurally, the metasedimentary rocks are folded into a large anticline that trends generally west-northwesterly through the Project site. Locally, the average dip of the rock units is between 30° and 60°. Ancient (pre-Holocene) faults have been observed within the proposed landfill footprint. The orientation of these faults is generally northwest-southeast, with dips that are nearly vertical. The age, location, orientation, and potential for future movement of both local and regional geologic faults is discussed in Section 3.9 of the EIS/EIR.

Extensive site-specific investigations have documented the presence of prominent, well developed, and extensively interconnected bedrock fracturing within the Project site and the surrounding Eagle Mountains (GeoSyntec 1992, 1993a, and 1993b, and 1996). The most highly developed, or primary, fracture system correlates with the general orientation of the principal geologic faults in the vicinity of the Project site. Some of the more important aspects of the bedrock fracturing with respect to the local groundwater environment are summarized in the following paragraphs.

Fracture Sets. Observations and data obtained from video, geological logs, and geophysical logs of boreholes and coreholes within the landfill footprint and elsewhere at the Project site were used to study fracture sets. In general, three principal sets of fractures referred to as primary, secondary, and tertiary have been observed at the Project site (GeoSyntec, 1992 and 1993). Primary fractures have the largest average size of opening (i.e., aperture) and density (i.e., frequency of occurrence), and appear to parallel the principal orientations of topographic features and major fault zones (i.e., northwest-southeast) with steep (60° to 90°) dips. Secondary fractures generally dip at low angles (i.e., approximately 20°). Both the primary and secondary fracture sets tend to maintain the same orientation at depth, but the apertures of both sets tend to decrease with depth. The tertiary fractures tend to close within a few tens of feet of depth. Average apertures for the primary and secondary fracture sets decrease from roughly 0.02 inches near the ground surface to approximately 0.01 inches at the depth of groundwater (i.e., several hundred feet). Apertures in the tertiary fracture set were generally observed to be closed within a few tens of feet from the ground surface.

Fracture Density. The density of larger fractures mapped at the ground surface ranged from less than 2 to more than 9 over discrete lateral distances of approximately 1 foot (GeoSyntec, 1992). In addition, numerous smaller fractures, spaced less than 1 inch apart, were reported to be common between the larger fractures.

Above the water table, calcite-filled fractures were commonly observed from borehole video logs, but open fractures with measurable apertures were found at intervals of 5 feet or less. Inspection of rock cores from below the water table revealed open fractures with measurable apertures at 6-inch intervals. In addition, fracturing was observed to be a function of both

lithology and structural features. Massive igneous intrusives such as quartz monzonite generally show less fracturing than the metasediments such as quartz. Dike-forming materials (e.g., andesite and diorite) have the highest degree of fracturing. Increased fracture densities and apertures are also typically associated with the traces of ancient (pre-Holocene) geologic faults at the Project site.

Porous-Media Equivalency

The occurrence and movement of groundwater in consolidated bedrock depends on the porosity and intrinsic permeability of the rock matrix and, more importantly, on the features associated with structural deformation (e.g., joints, fractures, bedding planes, eroded or weathered surfaces at formation contacts) that occur subsequent to consolidation. When these deformation features have measurable apertures, and occur at a sufficiently high frequency or density at the scale of interest (i.e., frequently intersect in an essentially continuous lateral and/or vertical pattern over the area studied), the physical properties of the rock resemble those of a granular (porous) medium.

If the fractured rock acts as a porous medium, hydrogeological interpretations and approximations of the fractured medium can be based on a representative continuum in which spatially defined values of aquifer properties (e.g., hydraulic conductivity, porosity, and compressibility) can be assigned (Freeze and Cherry, 1979). Because well established and accepted approximations of groundwater flow through porous media at the macro-scale (e.g., greater than the size of individual pores between soil particles), are based on the continuum approach, porous-media equivalency for a fractured-rock aquifer enables the same fundamental principals that describe flow through granular media to apply to the fractured rock. Porous-media equivalency, therefore, provides a common basis for the interpretation of the hydraulic characteristics of aquifers in both fractured-rock and granular materials, and facilitates the prediction of potential pathways for groundwater flow. As a result, porous-media equivalency forms the basis of the design for the proposed groundwater monitoring program.

Criteria for determining porous-media equivalency for fractured rock has been published by the US Environmental Protection Agency (US EPA, 1991). A comprehensive series of evaluations of field data from the Project site applying these criteria concluded that the fractured bedrock underlying the Project site is representative of a porous medium. The evaluations are presented in GeoSyntec (1992 and 1993b) and are summarized in GeoSyntec (1996).

Groundwater Occurrence in the Bedrock

General Characteristics. Bedrock is typically not considered to be a good medium for groundwater, particularly in arid regions where the potential for groundwater recharge is low. "Non-water bearing" is the term that is typically used to describe bedrock relative to the aquifers of the sediment-filled groundwater basins, which typically have higher permeabilities and more groundwater in storage. The metasedimentary and igneous rocks

that comprise the Eagle Mountains are generally hard and dense materials, and the rock matrix is relatively impermeable. As discussed above, however, these rocks are also highly fractured, and the numerous interconnecting fractures create conduits that facilitate groundwater flow.

The saturated portion of the bedrock in the vicinity of the Project site is considered to be an aquifer because data from local wells and piezometers that are screened entirely in the fractured rock have considerable sustained yields (e.g., 148 gallons per minute [gpm] for 100 continuous hours in piezometer P-20; and 75 gpm over 24 continuous hours in the School Well; well locations are identified in Figure C1-2). Well yields from the bedrock at the Project site, however, vary depending on the amount of localized fracturing and proximity to recharge zones. In contrast to the relatively high rates noted above, for example, maximum sustained yields during aquifer testing in MW-3, MW-7, MW-11, and MW-13 were all less than 2 gpm (see Figure C1-2 for well locations).

Based on the investigations conducted at the proposed Project site, the lateral extent of the bedrock aquifer effectively underlies all of the Eagle Mountains within the topographic divide of the Chuckwalla Valley (i.e., the groundwater conditions underlying the Project site can generally be extrapolated to occur elsewhere within the Eagle Mountains, as evidenced by the similar prevailing rock types, orientation, and range of ground-surface elevations, and the presence of springs). Because groundwater flow in the bedrock generally mimics the topography (discussed below), however, the extent of the local bedrock aquifer in the vicinity of the Project site is generally associated with the boundaries of the Eagle Creek watershed, which is the principal drainage for most of the Project site (i.e., within the Eagle Mountains, there are numerous natural groundwater-flow divides in the bedrock aquifer that likely mirror the pattern of surface-water divides, and groundwater in the bedrock under the Project site is largely recharged and flows within the Eagle Creek watershed). Only approximately 145 of the 2,164 acres of the proposed landfill footprint (i.e., in the northeast corner of the Project site) overlie bedrock but are outside the Eagle Creek Watershed.

In addition to underlying the Eagle Mountains, the bedrock aquifer extends under the unconsolidated sediments along the northwestern margins of the Chuckwalla Basin. Borehole logs in GeoSyntec (1992) indicate that the depth to the top of the bedrock under the basin sediments increases with increasing distance from the edge of the mountains. Where the overlying sediments of the Chuckwalla Basin are saturated they are known as the Chuckwalla aquifer (discussed below and in Section 3.1.1 of the EIS/EIR).

Water-level data indicate that groundwater flows from the bedrock into the Chuckwalla aquifer. Within the Project site, the location of the lateral contact between the bedrock and the Chuckwalla aquifers is variable. For example, in the vicinity of MW-5 and MW-1 (i.e., the east-central portion of the site), the contact is essentially at the edge of the Eagle Mountains. Within the alluvial fan deposits of Eagle Creek (i.e., the Townsite and extending southeast from the mouth of Eagle Creek to at least P-9 and P-10; see Figure C1-2), however, the lateral contact between the two aquifers is located more than a mile from the mountains.

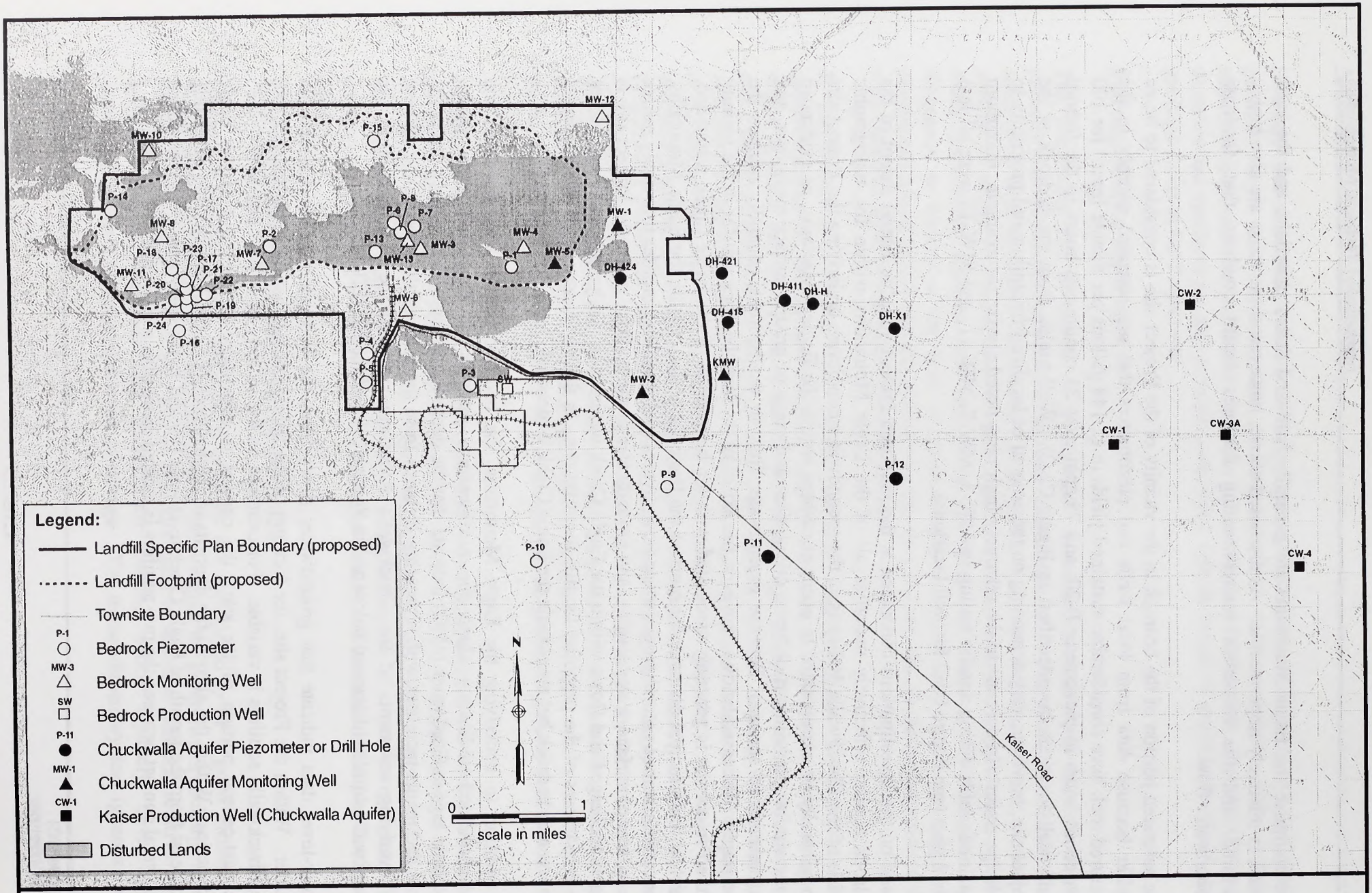


Figure C1-2
Groundwater Monitoring Points in the Vicinity of the Project Site
Eagle Mountain Landfill and Recycling Center EIS/EIR

CH2M HILL

Although the bedrock continues under the thickening wedge of saturated alluvium, the ability of the bedrock to be considered an aquifer declines with distance from the basin margins. In the more central portions of the basin, groundwater is more abundant and contained in a shallower and more permeable substrate within the Chuckwalla aquifer relative to the bedrock.

Groundwater Levels. Groundwater levels at the Project site have been determined from measurements in 48 boreholes, piezometers, wells. The locations of which are shown in Figure C1-2. Of the 48 monitoring locations, 32 represent conditions in the bedrock aquifer. Water-level data are available from selected locations for the periods: May to November of 1992, February to December 1993, and August 1995. The complete record of local water-level data is presented in GeoSyntec (1996) and listed in Table C1-1. The water-level data are representative of the local water table (i.e., the groundwater surface at atmospheric pressure) because of the extensive near-vertical oriented fracturing, the general absence of saturated overlying fine-grained sediments, and the proximity of the piezometer/well screen to the groundwater surface.

A map of the water-table elevations underlying the Project site is presented in Figure C1-3. The data in this figure are for June 1993, which is the most recent measurement period in which data are available for most of the piezometers and wells. Data from both the bedrock and the Chuckwalla aquifers are included on the map because both aquifers are considered to be hydraulically interconnected. This conclusion is supported by the consistency of the water-level data between aquifers. In addition, both aquifers are unconfined, and the bedrock is highly fractured and representative of a porous medium providing further support for direct hydraulic connection between aquifers.

The overall configuration of the water table in Figure C1-3 is representative of typical conditions because water-level maps based on data obtained both before and after June 1993 do not differ significantly (i.e., do not result in different interpretations of groundwater occurrence or movement). The water table generally follows the configuration of the local topography. The implications of this pattern on the directions of groundwater flow are discussed below.

Figure C1-3 also shows the locations of cross-sections through the proposed landfill footprint; these cross-sections are shown in Figures C1-4 and C1-5. Across the Project site, the depth to groundwater below the existing ground surface is typically several hundred to more than 1,000 feet deep. Groundwater depths are typically greatest under mountain ridges and the shallowest under canyon bottoms. Within the landfill footprint, the depth to groundwater under the current ground surface at the various monitoring points (December 1994 data) ranges from approximately 1,375 feet in P-14 at the western edge of Phase 1 to approximately 100 feet in MW-4 located in Phase 5. As a result of mining, however, the existing ground surface within the landfill footprint contains local features (e.g., excavated pits and tailing piles) that are not reflected in the water table (i.e., the water table does not necessarily mimic the ground surface at these features).

Table C1-1
Static Water-Level Elevation**

BOREHOLE NUMBER	5/6/92 ft	5/20/92 ft	6/3/92 ft	6/17/92 ft	7/1/92 ft	7/15/92 ft	7/29/92 ft	8/13/92 ft	8/26/92 ft
MON. WELLS									
MW - 1	706.15	706.37	705.97	705.78	705.95	706.63	706.44	705.15	705.15
MW - 2	686.01	685.84	685.84	685.26	685.26	685.16	684.26	683.84	683.93
MW - 3	758.09	757.84	746.01	756.06	755.72	755.26	755.34	756.01	753.38
MW - 4	703.90	703.69	703.69	703.19	702.69	703.57	703.61	702.61	702.73
MW - 5	699.78	699.79	699.53	699.32	698.71	699.34	699.07	697.28	698.73
MW - 6	772.14	772.22	772.15	771.77	768.54	(4)	769.39	769.56	771.89
MW - 7	(4)	916.45	914.46	615.90	915.82	915.74	(4)	915.49	918.90
MW - 8 (NEW)	(4)	938.53	937.56	635.80	936.84	938.08	939.75	933.92	937.04
MW - 9	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
MW - 10	1464.85	1448.44	1439.06	1427.27	1415.27	1271.06	1285.23	1285.32	1292.82
MW - 11	(4)	(4)	(4)	994.17	(4)	943.17	916.92	918.25	942.96
MW - 12	863.65	862.72	859.11	857.91	855.44	854.56	852.62	848.44	846.40
MW - 13	776.23	774.11	757.37	762.77	763.61	761.89	756.64	760.94	758.40
COREHOLES									
CH - 02	(4)	(4)	(4)	1120.33	1116.92	1115.67	1121.44	(4)	1117.79
CH - 03	NE	NE	NE	NE	NE	NE	(1)	(1)	(1)
CH - 3A	976.75	(20)	903.36	907.33	908.87	907.59	912.63	902.92	906.09
CH - 04	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
CH - 05	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(4)
CH - 10	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
CH - 11	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
CH - 12	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
PIEZ0METERS									
P - 1	699.37	700.27	700.49	699.45	698.24	698.79	698.41	697.37	697.66
P - 2	917.49	917.49	917.62	917.70	918.91	920.26	922.23	916.33	920.03
P - 3	736.48	736.31	735.40	735.19	735.27	734.97	733.52	733.02	733.31
P - 4	(2)	(2)	(2)	(2)	913.25	919.25	(4)	916.83	918.87
P - 5	(2)	(2)	(2)	(2)	(2)	918.06	(4)	915.75	917.75
P - 6	791.36	790.88	786.02	782.38	779.51	775.76	772.42	769.01	766.74
P - 7	756.29	765.39	755.79	752.75	754.34	753.67	758.28	754.38	751.84
P - 8	779.02	780.71	774.68	767.10	766.14	764.35	763.53	763.14	762.6
P - 9	(3)	582.60	582.18	582.85	582.85	583.06	582.10	584.35	582.1
P - 10	(3)	582.82	583.03	583.23	582.98	583.50	582.07	584.23	582.49
P - 11	(3)	576.34	577.65	577.39	578.01	579.01	578.14	580.68	578.34
P - 12	(3)	(3)	(3)	511.03	504.42	505.53	503.73	505.28	502.28
P - 13	(3)	(3)	(3)	799.25	799.68	799.97	802.05	800.97	800.63
P - 14	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
P - 15	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
P - 16	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
P - 17	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
P - 18	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
P - 19	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
P - 20	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
P - 21	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
P - 22	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
P - 23	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
P - 24	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
DRILL HOLES									
DH - 421	686.18	685.93	686.33	686.10	686.02	686.33	685.90	687.60	685.97
DH - 411	673.19	673.03	673.17	672.80	672.73	672.67	672.03	670.74	671.82
DH - H	654.73	654.98	654.94	654.71	656.89	655.60	684.68	655.31	653.85
DH - X1	645.45	645.49	645.54	645.00	647.04	646.45	645.29	646.95	644.21
DH I Y	685.75	675.58	675.83	675.50	675.33	675.65	674.58	676.75	674.50
DH - 410	670.12	669.62	669.92	669.65	671.29	669.96	669.04	670.54	668.46
DH - 415	682.88	682.71	683.17	682.88	683.04	682.73	682.58	684.50	682.88
DH - 424	698.67	698.76	690.88	698.51	698.42	698.00	697.13	697.05	698.13
MISC. WELLS									
SCHOOL	(4)	716.70	713.70	713.45	712.78	713.16	711.32	710.95	711.03
CW#1	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
CW#2	(4)	(4)	(4)	469.50	470.42	469.00	469.34	471.94	468.83
CW#3	(4)	(4)	(4)	(4)	(4)	(4)	474.67	476.17	475.04
CW#4	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
KAISER MW	669.41	669.16	666.41	665.03	668.99	668.86	668.08	667.74	667.

** Source: GeoSyntec Consultants 1996

(1) Hole Abandoned
(2) Obstruction in Borehole
(3) Borehole not yet completed
(4) SWL could not be obtained.
(-) Data not collected.

Table C1-1
Static Water-Level Elevation**

BOREHOLE NUMBER	9/28/92 ft	11/6/92 ft	2/4/93 ft	2/18/93 ft	3/3/93 ft	3/18/93 ft	4/1/93 ft	4/15/93 ft	4/28/93 ft
MON. WELLS									
MW - 1	705.40	705.15	704.65	704.13	703.40	701.61	701.24	701.09	701.50
MW - 2	683.76	683.09	682.51	681.32	681.09	678.18	678.99	678.52	678.50
MW - 3	753.63	752.92	755.38	756.06	755.21	752.65	751.75	750.84	750.31
MW - 4	700.27	701.57	699.86	699.65	697.35	686.61	696.25	696.02	695.74
MW - 5	697.69	697.28	696.15	695.84	694.85	693.61	693.36	693.17	693.06
MW - 6	771.10	769.72	768.81	766.97	768.18	764.37	764.79	764.36	764.72
MW - 7	918.95	916.73	919.73	916.13	915.27	916.21	917.31	916.67	918.27
MW - 8 (NEW)	937.37	936.92	937.90	934.04	929.46	930.29	931.04	931.37	931.57
MW - 9	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
MW - 10	1305.96	1313.32	1316.26	1320.53	1290.89	1335.04	1351.80	1347.73	1341.47
MW - 11	915.79	918.59	920.92	918.54	916.52	915.37	918.67	911.78	917.10
MW - 12	842.14	836.61	827.94	826.40	799.32	802.12	805.37	807.48	793.02
MW - 13	756.42	755.05	756.34	758.67	758.79	755.83	755.62	753.34	752.66
COREHOLES									
CH - 02	(4)	1118.46	1113.11	1118.71	1125.41	1124.46	1114.15	1114.70	1114.60
CH - 03	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
CH - 3A	905.86	906.67	(4)	907.25	908.22	901.91	904.67	904.45	904.87
CH - 04	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
CH - 05	795.45	797.26	809.12	810.53	815.18	811.39	814.97	814.97	815.66
CH - 10	(1)	(1)	(1)	(1)	(1)	1151.95	1154.73	1155.48	1156.19
CH - 11	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
CH - 12	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
PIEZ0METERS									
P - 1	697.08	696.03	694.53	694.14	693.90	692.10	694.36	693.28	694.86
P - 2	920.99	919.45	920.74	921.79	917.52	918.10	921.74	921.91	922.18
P - 3	735.10	732.77	731.39	730.87	732.71	729.39	729.90	729.75	728.66
P - 4	928.79	917.83	919.75	919.62	917.80	918.12	917.14	918.19	917.94
P - 5	917.33	916.42	919.00	918.92	916.15	916.62	915.20	916.39	916.01
P - 6	766.63	762.26	769.84	770.34	772.09	769.81	766.65	764.09	761.85
P - 7	752.13	751.38	753.59	754.05	755.12	752.60	751.79	750.96	749.98
P - 8	761.18	758.81	760.22	761.31	763.97	761.24	763.69	758.73	757.42
P - 9	582.39	583.20	582.44	582.04	583.97	581.28	581.20	581.15	580.92
P - 10	(4)	585.50	583.40	583.09	585.41	582.17	582.48	582.89	582.70
P - 11	578.72	578.72	578.20	577.54	579.24	577.28	577.11	577.10	576.90
P - 12	501.36	501.38	502.03	501.13	502.72	501.31	500.83	500.73	500.52
P - 13	774.81	766.13	766.96	766.80	763.15	758.09	763.51	763.50	763.90
P - 14	(3)	1028.31	973.60	976.63	970.53	970.69	969.69	968.99	968.25
P - 15	(3)	1043.14	1041.16	1043.03	1045.86	(4)	1041.46	1040.83	1041.13
P - 16	(3)	1017.20	990.02	988.52	989.31	983.36	983.78	983.30	982.49
P - 17	(3)	(3)	(3)	920.29	913.03	913.80	914.52	914.50	914.50
P - 18	(3)	(3)	(3)	(3)	914.43	915.34	916.33	916.09	915.28
P - 19	(3)	(3)	(3)	(3)	(3)	902.08	902.56	902.67	902.72
P - 20	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
P - 21	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
P - 22	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
P - 23	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
P - 24	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
DRILL HOLES									
DH - 421	686.35	686.64	678.02	686.58	688.31	687.21	686.77	686.69	686.67
DH - 411	671.69	671.86	671.03	670.46	671.61	670.04	669.77	669.53	669.58
DH - H	653.77	653.71	652.81	652.21	653.53	651.81	651.52	651.17	651.15
DH - X1	644.33	643.08	643.08	642.74	643.64	642.37	642.22	641.86	641.89
DH I Y	674.79	674.33	674.25	674.00	675.10	673.88	673.30	673.29	673.06
DH - 410	668.04	668.16	667.04	666.81	667.71	667.21	665.69	665.67	665.60
DH - 415	683.09	683.69	684.04	683.50	684.57	683.35	683.20	683.16	683.27
DH - 424	699.84	696.72	696.42	695.61	696.79	694.96	694.56	694.40	694.56
MISC. WELLS									
SCHOOL	711.20	(20)	708.62	708.82	711.16	707.50	708.13	(4)	699.30
CW#1	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
CW#2	469.50	470.02	469.96	470.60	471.15	469.62	468.31	469.40	469.38
CW#3	474.79	469.67	475.17	473.98	476.00	474.67	473.21	474.31	474.39
CW#4	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
KAISER MW	667.82	667.87	666.74	666.74	667.94	666.56	665.96	665.86	665.74

** Source - GeoSyntec Consutlants 1996

(1) Hole Abandoned
(2) Obstruction in Borehole
(3) Borehole not yet completed
(4) SWL could not be obtained.
(-) Data not collected.

Table C1-1
Static Water-Level Elevation **

BOREHOLE NUMBER	5/11/93 ft	5/27/93 ft	6/16/93 ft	7/15/93 ft	8/16/93 ft	9/30/93 ft	11/5/93 ft	11/10/93 ft	12/9 -12/14 ft	8/9 -8/01/95 ft
MON. WELLS										
MW - 1	701.16	700.58	700.83	700.40	700.14	700.05	699.39	—	698.91	694.3
MW - 2	678.41	678.57	678.01	677.41	677.11	676.87	675.15	—	674.67	—
MW - 3	750.18	749.02	748.26	747.26	746.09	751.27	751.89	—	750.27	—
MW - 4	695.54	695.08	694.93	694.21	693.13	693.36	692.97	—	692.66	—
MW - 5	692.86	692.26	692.42	691.80	691.24	690.81	690.45	—	689.76	—
MW - 6	764.59	764.29	766.05	762.61	762.39	763.19	—	760.55	765.45	—
MW - 7	918.45	918.35	918.41	916.22	916.35	919.55	—	915.77	919.79	916.11
MW - 8 (NEW)	932.24	932.41	932.56	930.29	930.17	931.69	931.84	—	935.92	—
MW - 9	(2)	(2)	(2)	(2)	(2)	(2)	(2)	—	(2)	—
MW - 10	1203.39	1230.74	1257.62	1264.37	1243.53	1243.53	1277.51	—	1293.00	—
MW - 11	917.58	917.52	917.58	917.42	915.55	916.68	916.93	—	920.85	915.09
MW - 12	800.69	806.39	808.50	801.62	808.27	811.06	806.93	—	809.41	805.97
MW - 13	752.62	751.42	751.03	749.78	749.19	765.06	758.01	—	755.09	—
COREHOLES										
CH - 02	1115.34	1115.42	(4)	(4)	(4)	(4)	(4)	—	(4)	—
CH - 03	(1)	(1)	(1)	(1)	(1)	(1)	(1)	—	(1)	—
CH - 3A	904.60	904.54	903.56	900.42	896.48	892.88	889.25	—	890.07	—
CH - 04	(4)	(4)	(4)	(4)	(4)	(4)	(4)	—	(4)	—
CH - 05	816.00	815.34	815.55	815.03	814.81	812.06	809.46	—	807.54	—
CH - 10	1155.98	1154.31	1150.38	1145.07	1140.12	1134.57	—	1131.16	1117.84	—
CH - 11	(1)	(1)	(1)	(1)	(1)	(1)	(1)	—	(1)	—
CH - 12	(1)	(1)	(1)	(1)	(1)	(1)	(1)	—	(1)	—
PIEZ0METERS										
P - 1	694.91	695.27	692.40	691.93	691.59	691.01	690.10	—	689.71	685.02
P - 2	922.29	922.42	922.36	922.41	922.49	923.97	924.06	—	923.62	—
P - 3	728.45	728.05	727.70	727.21	727.76	729.18	729.97	—	729.90	—
P - 4	917.81	917.81	917.69	917.71	917.87	918.02	918.13	—	917.96	—
P - 5	915.97	915.97	915.85	915.89	915.92	918.19	916.43	—	916.39	915.50
P - 6	760.28	758.60	756.55	757.70	752.69	832.15	792.28	—	775.50	—
P - 7	749.38	748.83	747.86	747.05	745.90	750.61	751.09	—	748.98	737.59
P - 8	756.29	755.01	753.55	751.86	749.99	790.01	774.17	—	766.25	740.2
P - 9	580.95	580.97	581.17	580.64	580.67	580.47	580.35	—	580.15	—
P - 10	582.74	582.80	582.75	582.64	582.56	582.41	582.30	—	582.22	—
P - 11	576.97	577.04	576.96	576.78	576.59	576.39	576.34	—	576.29	—
P - 12	500.64	500.50	500.43	500.23	500.13	500.02	500.03	—	499.95	—
P - 13	762.90	763.37	762.17	761.82	761.25	761.71	762.45	—	762.60	—
P - 14	967.78	967.24	966.71	966.19	965.58	964.89	964.28	—	(4)	(4)
P - 15	1041.72	1041.39	1042.04	1039.23	(4)	(4)	(4)	—	(4)	(4)
P - 16	982.26	981.85	981.49	(4)	(4)	(4)	(4)	—	(4)	(4)
P - 17	914.71	914.62	914.48	914.63	914.56	915.27	915.71	—	915.98	—
P - 18	915.57	916.46	916.41	916.52	916.40	917.43	918.02	—	916.49	—
P - 19	904.32	904.31	904.20	903.22	904.27	905.01	905.52	—	906.65	—
P - 20	(3)	(3)	(3)	(3)	(3)	(3)	(3)	911.23	911.87	912.38
P - 21	(3)	(3)	(3)	(3)	(3)	916.20	916.32	—	913.29	—
P - 22	(3)	(3)	(3)	(3)	(3)	926.82	919.30	—	914.47	—
P - 23	(3)	(3)	(3)	(3)	(3)	915.30	915.49	—	914.67	—
P - 24	(3)	(3)	(3)	(3)	(3)	910.80	(3)	912.99	910.10	—
DRILL HOLES										
DH - 421	686.47	686.51	686.55	686.52	687.46	686.82	686.79	—	686.64	—
DH - 411	669.30	669.15	669.00	666.67	668.39	667.88	667.46	—	667.12	—
DH - H	650.98	650.67	650.47	650.34	649.79	649.44	649.22	—	649.05	—
DH - X1	641.30	640.85	640.54	640.49	640.01	639.78	639.66	—	639.54	—
DH I Y	672.76	672.56	672.61	672.56	971.44	(4)	(4)	—	(4)	—
DH - 410	665.35	665.18	664.91	664.74	664.40	663.91	663.51	—	663.17	—
DH - 415	683.16	680.68	684.57	683.58	684.66	683.87	683.88	—	683.90	—
DH - 424	694.82	694.06	693.50	693.61	693.05	692.63	692.24	—	691.73	—
MISC. WELLS										
SCHOOL	709.95	709.34	709.29	705.79	705.70	705.54	—	706.69	707.10	—
CW#1	(4)	(4)	(4)	(4)	(4)	(4)	(4)	—	(4)	—
CW#2	468.00	469.15	468.90	469.02	469.27	469.73	469.25	—	469.43	—
CW#3	475.22	475.68	474.16	474.00	474.30	474.29	474.10	—	474.22	—
CW#4	(4)	(4)	(4)	(4)	(4)	(4)	(4)	—	(4)	—
KAISER MW	665.94	665.57	665.32	664.94	664.55	664.49	663.74	—	663.54	—

** Source - GeoSyntec Consutlants 1996

(1) Hole Abandoned
(2) Obstruction in Borehole
(3) Borehole not yet completed
(4) SWL could not be obtained.
(-) Data not collected.

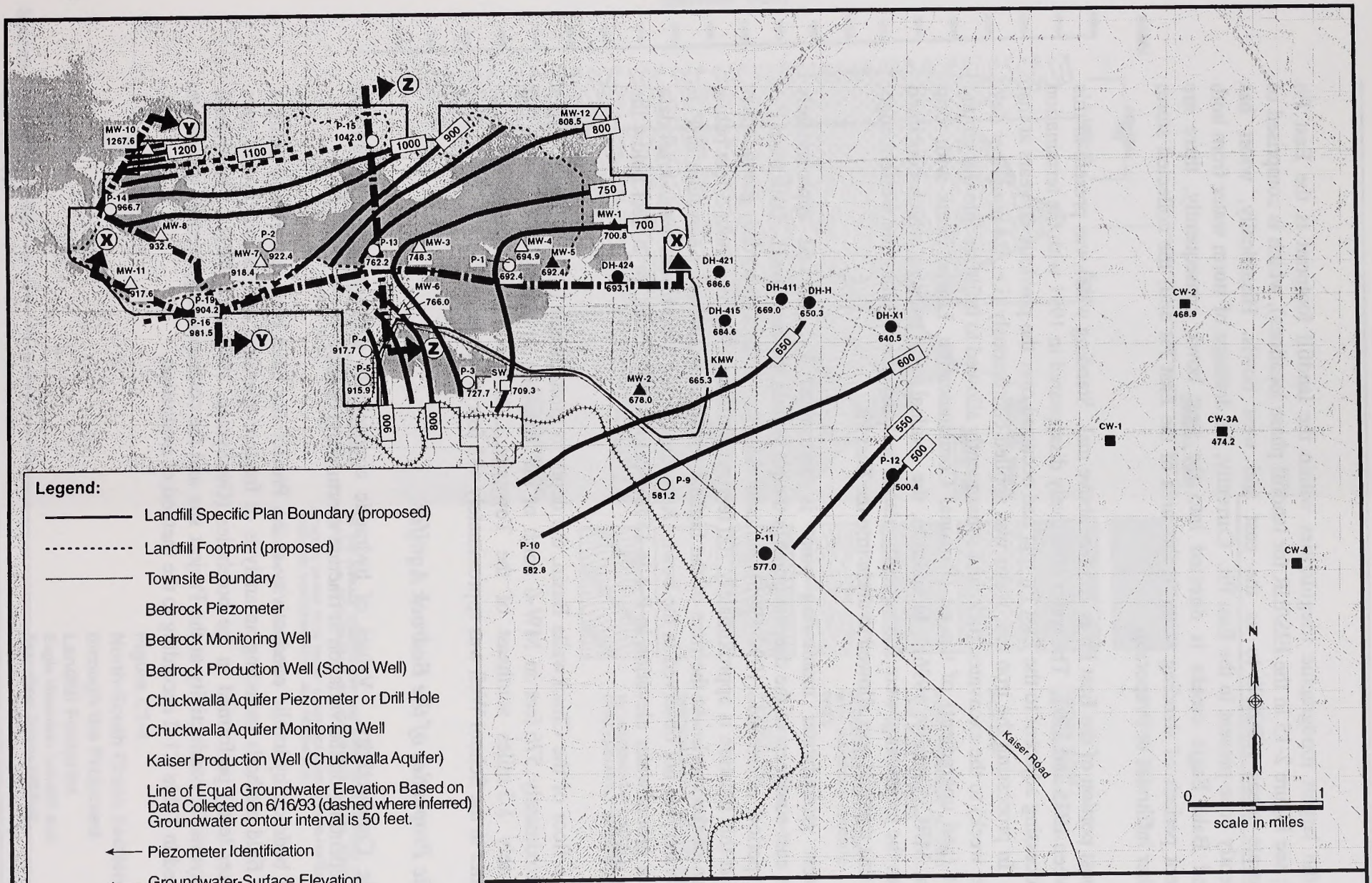


Figure C1-3
Groundwater-Surface Elevations in the Vicinity of the Project Site
Eagle Mountain Landfill and Recycling Center EIS/EIR

CH2M HILL

m115231.T6.20 FLewis16 6/96

One of the largest topographic irregularities within the landfill footprint is the East Pit (Phase 5; see Figure 2-15 in the EIS/EIR for landfill phase locations), which is comprised of two separate areas referred to as the east and west bowls. Historically, water has intermittently been present in the East Pit. Currently, the drainage of storm water from both Eagle and Bald Eagle creeks is directed into the west bowl; consequently, there are intermittent periods of standing water in this area of the East Pit until the collected storm water either infiltrates or evaporates.

The deepest portion of the East Pit is 705 feet above msl. Standing water was present in this area between 1975 and 1991. The water effectively disappeared in 1991 with the termination of ore processing adjacent to the East Pit that had occurred over the previous 40 years at that location. In processing the iron ore, water was applied continuously (i.e., 24 hours per day, 7 days per week) to the excavated rock, and subsequently allowed to infiltrate into the ground northwest (and upgradient) of the pit (Personal Communication, Lewis, Frank with Orlo Anderson, MRC. January, 1996). In addition, the residual rock tailings, which contained water from the processing, were subsequently placed back into the pit along the western edge. Water in this material was allowed to drain into the East Pit.

The nearest groundwater monitoring point is piezometer P-1, located approximately 1,100 feet east-southeast of the deepest point in the pit (within the east bowl). Data from P-1 over the period of record (1992-1995) indicate that the highest recorded groundwater elevation at this location is approximately 700 feet msl (in June 1992), or about 5 feet below the bottom of the bowl. At the time of the highest recorded groundwater elevation in P-1, standing water was not observed in the bowl. According to the most recent water-level data (1995), the groundwater elevation in P-1 is 15 feet below 1992 levels, or 20 feet below the bottom of the pit.

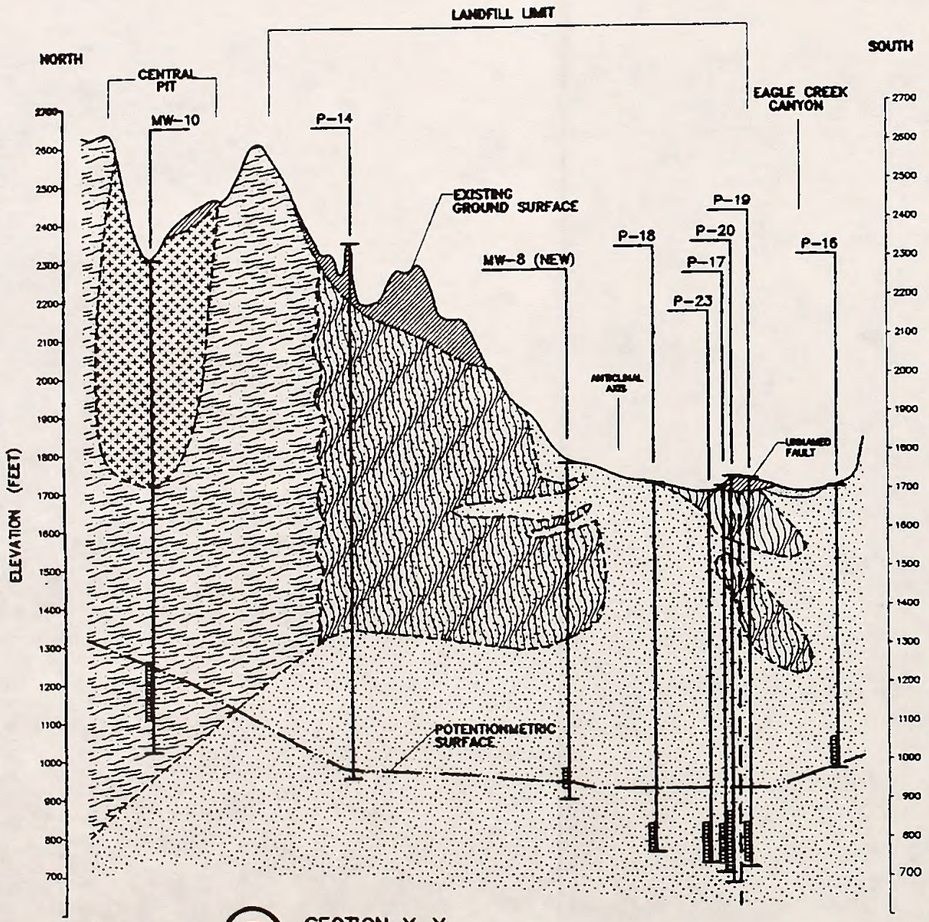
Out on the floor of the Chuckwalla Basin, the depth to groundwater in the bedrock ranges from approximately 576 feet in MW-6 north of the Townsite to roughly 430 feet in P-9 approximately 1.5 miles southeast of the Townsite. At the Townsite, the depth to groundwater in the School Well was approximately 485 feet in August 1992.

Hydraulic Properties of the Bedrock Aquifer

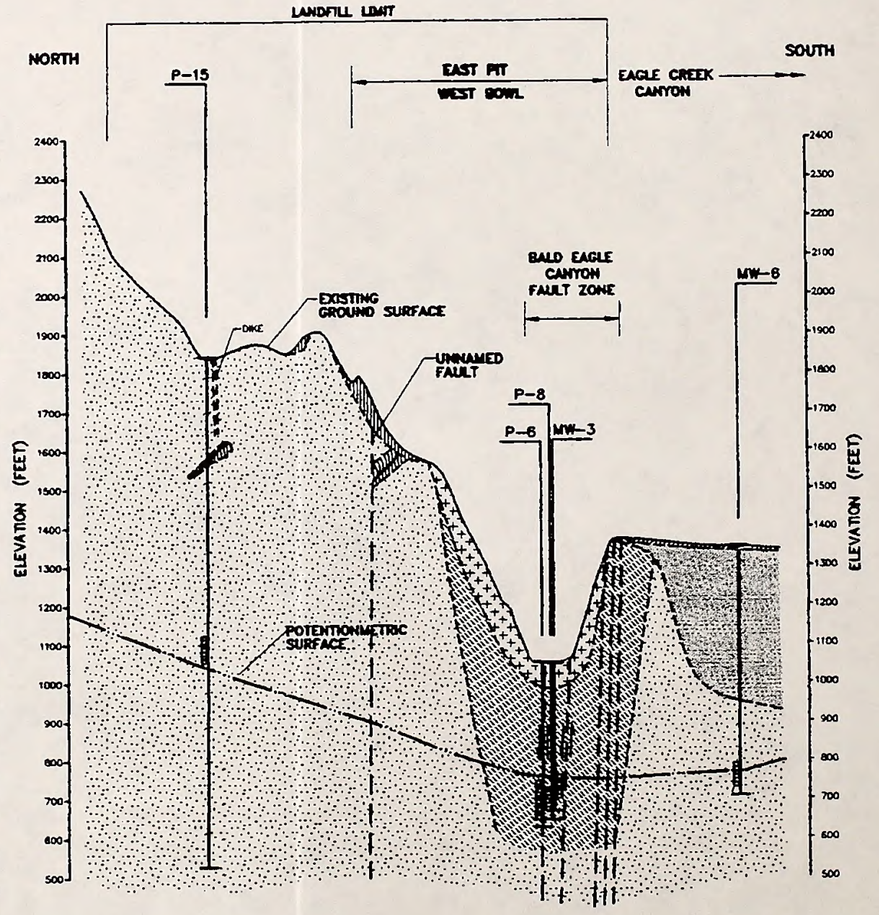
Hydraulic Conductivity. Values of hydraulic conductivity differ spatially within the bedrock depending on the variation in fracture aperture and density.

Values of bedrock hydraulic conductivity at the Project site have been determined using a variety of field methods including an analysis of fracture apertures and various in-situ tests (e.g., packer tests) performed in the boreholes (GeoSyntec, 1992 and 1993). The overall range of hydraulic conductivity at the Project site and the corresponding average values are summarized in Table C1-2 according to the method of evaluation.

HYDROGEOLOGIC CROSS SECTIONS Y–Y AND Z–Z



SECTION Y–Y
HORIZONTAL SCALE: 1" = 2000'
VERTICAL SCALE: 1" = 400'



SECTION Z–Z
HORIZONTAL SCALE: 1" = 2000'
VERTICAL SCALE: 1" = 400'

LEGEND

- ARTIFICIAL FILL
- CANYDN FLOOR QUATERNARY ALLUVIUM
- IRON ORE
- HYDROTHERMALLY ALTERED METASEDIMENTARY ROCK AND SOME ALTERED IGNEOUS ROCK
- METASEDMENTARY ROCKS WITH NUMEROUS ANDESITE DIKES
- QUARTZITE THICKLY INTRUDED BY GRANITIC ROCK
- GRANITIC INTRUSIVE ROCK (PREDOMINANTLY QUARTZ MONZONITE)
- METASEDIMENTARY ROCK (PREDOMINANTLY QUARTZITE)

NOTES:

1. GEOLOGY IS BASED ON THE SURFACE GEOLOGIC MAP AND BORING LOGS-PREPARED BY GSi/water [GEOSYNTEC, 1992, PLATES 1 & 2]. SUBSURFACE GEOLOGY BETWEEN CONTROL POINTS IS GENERALIZED.
2. POTENTIOMETRIC SURFACE IS DRAWN FROM FIGURE 5 AND MEASURED GROUND-WATER LEVEL ELEVATIONS IN THE INDICATED MONITORING WELLS AND PIEZOMETERS.
3. SEE FIGURE 3.1-6 FOR LINE OF CROSS SECTION.

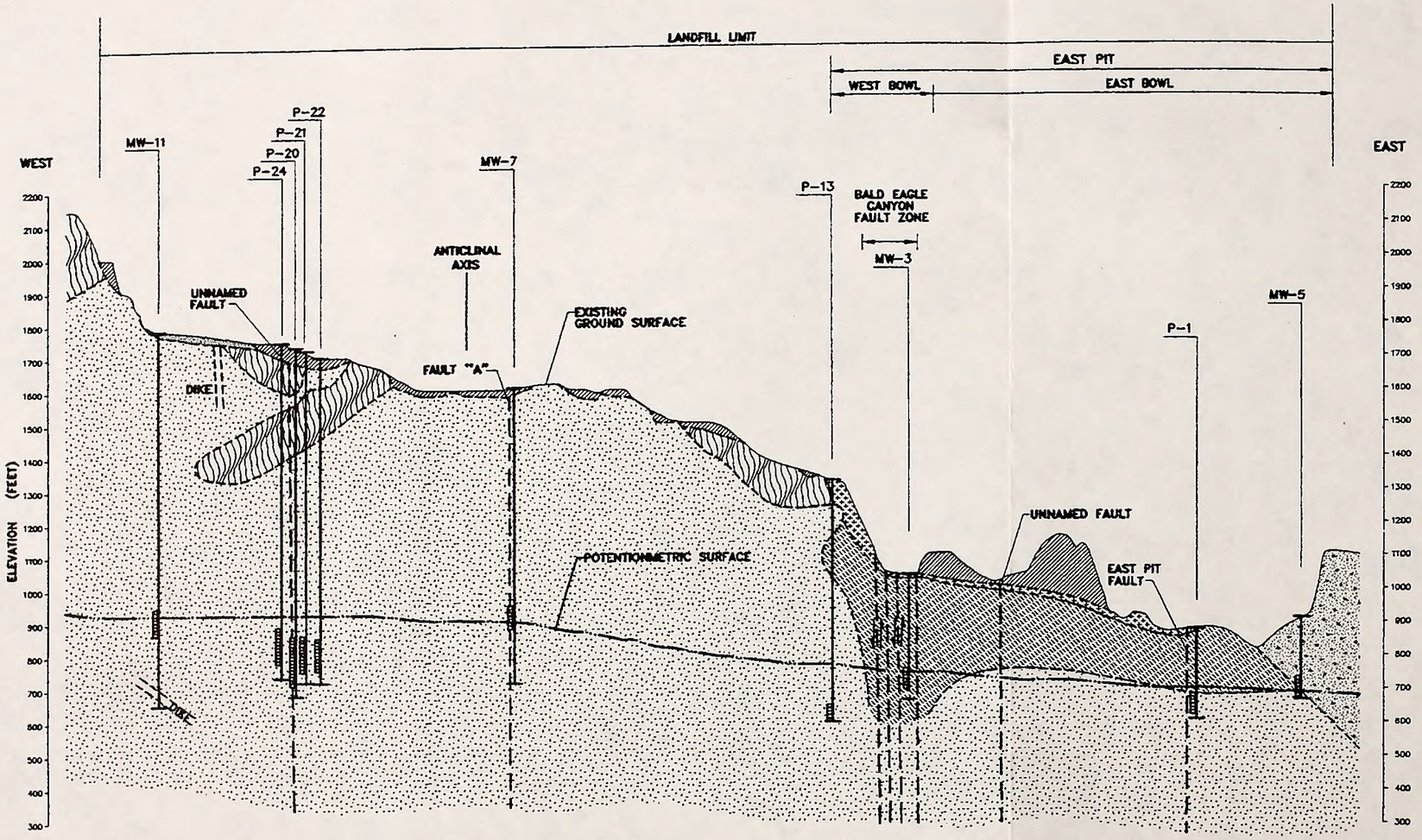
Source: GeoSyntec 1996

Figure C1-4
North-South Cross Sections through the Proposed Landfill Footprint
Eagle Mountain Landfill and Recycling Center EIS/EIR

CH2M HILL



HYDROGEOLOGIC CROSS SECTION X–X



LEGEND

- ARTIFICIAL FILL
- CANYON FLOOR QUATERNARY ALLUVIUM
- CHUCKWALLA VALLEY ALLUVIUM (INCLUDES DEBRIS FLOWS)
- IRON ORE
- HYDROTHERMALLY ALTERED METASEDIMENTARY ROCK AND SOME ALTERED IGNEOUS ROCK
- GRANITIC INTRUSIVE ROCK (PREDOMINANTLY QUARTZ MONZONITE)
- METASEDIMENTARY ROCK (PREDOMINANTLY QUARTZITE)

NOTES:

1. GEOLOGY IS BASED ON THE SURFACE GEOLOGIC MAP AND BORING LOGS PREPARED BY GSI/water [GEOSYNTEC, 1992, PLATES 1 & 2]. SUBSURFACE GEOLOGY BETWEEN CONTROL POINTS IS GENERALIZED.
2. POTENTIOMETRIC SURFACE IS DRAWN FROM FIGURE 5 AND MEASURED GROUND-WATER LEVEL ELEVATIONS IN THE INDICATED MONITORING WELLS AND PIEZOMETERS.
3. SEE FIGURE 3.1-6 FOR LINE OF CROSS SECTION.

SECTION X–X

HORIZONTAL SCALE: 1" = 2000'
VERTICAL SCALE: 1" = 400'

Source: GeoSyntec 1996

Figure C1-5
East-West Cross Section through the Proposed Landfill Footprint
Eagle Mountain Landfill and Recycling Center EIS/EIR

CH2M HILL



Table C1-2 Hydraulic Conductivity of the Bedrock Aquifer at the Project Site		
Method of Evaluation	**Range (cm/s)**	**Geometric Mean[1] (cm/s)**
Fracture Analysis	6×10^{-6} to 1×10^{-2}	5.4×10^{-4}
Packer Tests	2×10^{-6} to 5×10^{-4}	2.1×10^{-5}
[1]The geometric mean is representative of "average" values because hydraulic conductivity was found to be log-normally distributed (GeoSyntec, 1992)		

The available data indicate a general consistency in bedrock hydraulic conductivity across the project site, with most values between 10^{-5} and 10^{-4} centimeters per second (cm/s). These values represent moderate to low hydraulic conductivity equivalent to a silty sand (Freeze and Cherry, 1979). Specific variation in the horizontal plane can be seen in the areal distribution of hydraulic conductivity obtained by packer tests and fracture analysis summarized in Table C1-3 according to landfill phase. Locally, areas of relatively high hydraulic conductivity (i.e., 10^{-3} to 10^{-2} cm/s have been identified at the Project site in conjunction with the occurrence of either geologic faults or dikes (GeoSyntec, 1996).

In general, the hydraulic conductivity of fractured rock decreases with depth because the higher pressures result in fewer fractures and smaller apertures. Site-specific data from both packer testing and fracture analysis generally confirm that this trend occurs at the Project site (GeoSyntec, 1993). At three locations (P-3, P-20, and MW-13), however, this general trend is reversed due to the localized presence of faults or a particular lithologic sequence in which more fracture-prone rock occurs at depth.

Groundwater Storage. The capacity of the local bedrock aquifer to store water is small. The results of three bedrock-aquifer pumping tests conducted within the proposed landfill footprint yielded low values (e.g., between 0.001 and 0.008) of aquifer specific yield (i.e., the volume of groundwater released from storage per unit surface area of aquifer per unit decline in water level) for an unconfined aquifer (i.e., one in which the groundwater surface is defined by a water table at atmospheric pressure). (See GeoSyntec, 1992 and 1993 for complete descriptions of the aquifer testing and the associated results.)

Groundwater Flow in the Bedrock Aquifer

General Flow Directions. Because the local bedrock is representative of a porous medium (discussed above), the general direction of horizontal groundwater flow in the bedrock aquifer can be interpreted from the water-table contours (Figure C1-3) using the same approach as typically applied for granular media (i.e., flow is normal to lines of equal potential in homogeneous and isotropic media). Based on the water-table configuration in Figure C1-3, the general directions of flow in the bedrock aquifer are toward: (1) the south in the Phase 1, Phase 2 and northern portion of the Phase 3 areas of the proposed landfill footprint; (2) the southeast in Phase 4, Phase 5, southern portion of Phase 3, and southeast of the Townsite; and (3) the east in the Townsite.

Table C1-3

Areal Distribution of Hydraulic Conductivity Obtained From Packer Tests and Detailed Fracture Analysis [1]

PHASE 1 AND PHASE 2 AREAS				PHASE 3 AREA				PHASE 4 AREA			
HYDRAULIC CONDUCTIVITY CALCULATED FROM PACKER TESTS (cm/s)											
Corehole	Minimum	Maximum	Geometric Mean	Corehole	Minimum	Maximum	Geometric Mean	Corehole	Minimum	Maximum	Geometric Mean
CH-2	6×10^{-6}	1×10^{-4}	4×10^{-5}	CH-3A	3×10^{-5}	5×10^{-5}	4×10^{-5}	CH-12	2×10^{-6}	2×10^{-5}	8×10^{-6}
CH-11	6×10^{-6}	5×10^{-4}	3×10^{-6}					CH-5A	5×10^{-6}	7×10^{-5}	1×10^{-5}
HYDRAULIC CONDUCTIVITY CALCULATED FROM DETAILED FRACTURE ANALYSES (cm/s)											
Borehole	Minimum	Maximum	Geometric Mean	Borehole	Minimum	Maximum	Geometric Mean	Borehole	Minimum	Maximum	Geometric Mean
MW-11	8×10^{-5}	8×10^{-3}	9×10^{-4}	P-2	3×10^{-5}	6×10^{-3}	7×10^{-4}	P-1	5×10^{-4}	1×10^{-2}	2×10^{-3}
P-17[2]	1×10^{-4}	3×10^{-3}	5×10^{-4}	P-6[2]	1×10^{-4}	3×10^{-3}	7×10^{-4}	MW-12	2×10^{-4}	2×10^{-2}	1×10^{-3}
P-20[2]	6×10^{-5}	4×10^{-3}	8×10^{-4}	P-7[3]	9×10^{-6}	1×10^{-3}	2×10^{-4}				
P-21[2]	6×10^{-5}	3×10^{-3}	3×10^{-4}	P-8[3]	1×10^{-4}	1×10^{-3}	4×10^{-4}				
				P-13	6×10^{-6}	2×10^{-3}	2×10^{-4}				

[1] This table is reprinted from GeoSyntec (1992).

[2] Piezometers P-17, P-20, and P-21 are in close proximity.

[3] Piezometers P-6, P-7, and P-8 are in close proximity.

Groundwater Velocity. The average horizontal velocity of groundwater flow is proportional to the hydraulic conductivity and the horizontal component of hydraulic gradient, and inversely proportional to the effective porosity of the bedrock. Values of these parameters vary spatially beneath the landfill footprint. Igneous and metamorphic rocks (i.e., the principal rock types of the Eagle Mountains) typically have values of porosity that range between 1 and 10 percent (Davis and DeWiest, 1966). GeoSyntec (1992) estimated that the average effective porosity of the bedrock underlying the Project site is approximately 5 percent. Based on this value of porosity (5 percent), the groundwater levels in Figure C1-3, and the range of hydraulic conductivity values presented above (see Table C1-2), groundwater velocities in the local bedrock range between approximately 3 and 30 feet per year, with a representative value on the order of 10 feet per year (GeoSyntec, 1992).

Bedrock Aquifer Recharge. Recharge to the bedrock aquifer occurs either as a result of direct precipitation on outcrop areas or from infiltration through overlying alluvium. The arid climate, local rugged topography, and the tendency for rainfall to be of short duration and high intensity, all combine to create unfavorable conditions for recharge to the bedrock aquifer.

As discussed above, the Eagle Creek watershed is representative of the recharge area for the local bedrock aquifer in the vicinity of the Project site. Based on the size of this watershed (approximately 6,400 acres [see Section 3.6 of the EIS/EIR]), the average annual rainfall in the Eagle Mountains (3.5 inches [GeoSyntec, 1992], and the assumption that 10 percent of the rainfall infiltrates to groundwater [Mann, 1986], it is estimated that approximately 200 acre-feet per year (ac-ft/yr) enters the groundwater as direct infiltration from precipitation or runoff.

Chuckwalla Aquifer

The Chuckwalla aquifer, which consists of the saturated sediments that overlie the bedrock within the Chuckwalla Basin, is a significant regional groundwater resource relative to the bedrock aquifer.

Physical Setting

The Chuckwalla Basin (Figure C1-1) is bordered by the Eagle Mountains to the west, and the Orocopia, Chuckwalla, Little Chuckwalla, and Mule mountains to the south. The northern boundary is comprised of several north-south trending mountain ranges that extend into the valley. In the gaps between these mountains, the basin is bordered by five other groundwater basins. Three of these surrounding basins are important with respect to Chuckwalla aquifer in the vicinity of the Project site (see Figure C1-6): (1) the Pinto Valley Groundwater Basin (Pinto Basin), located north and hydraulically upgradient of the Project site; (2) the Orocopia Valley Groundwater Basin (Orocopia Basin), located south of the Eagle Mountains, immediately west and hydraulically upgradient of the Chuckwalla Basin; and (3) the Palo Verde Mesa Groundwater Basin, located immediately east, and downgradient, of the Chuckwalla Basin.

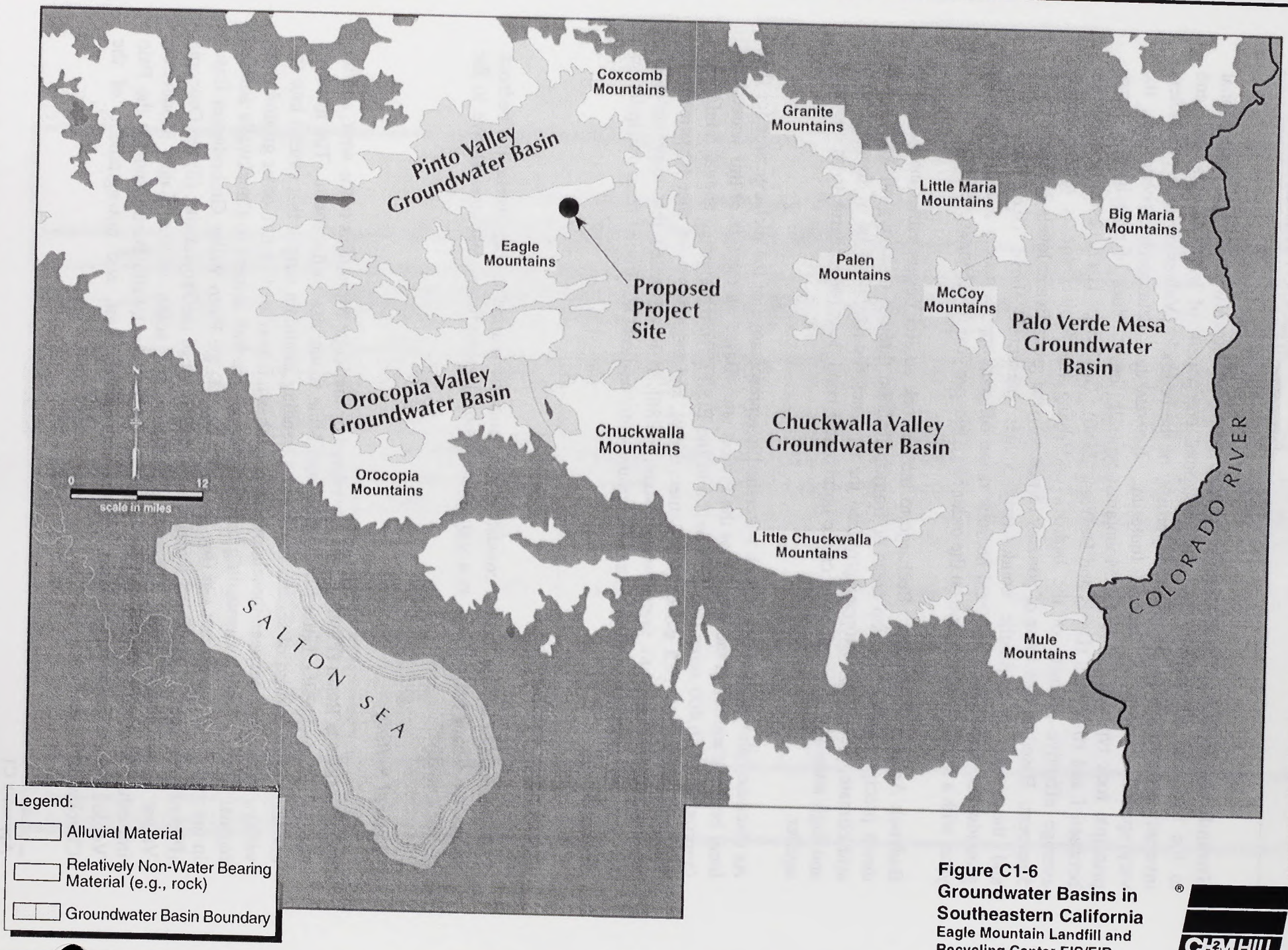


Figure C1-6
Groundwater Basins in Southeastern California
Eagle Mountain Landfill and Recycling Center EIS/EIR

CH2M HILL

Aquifer Composition

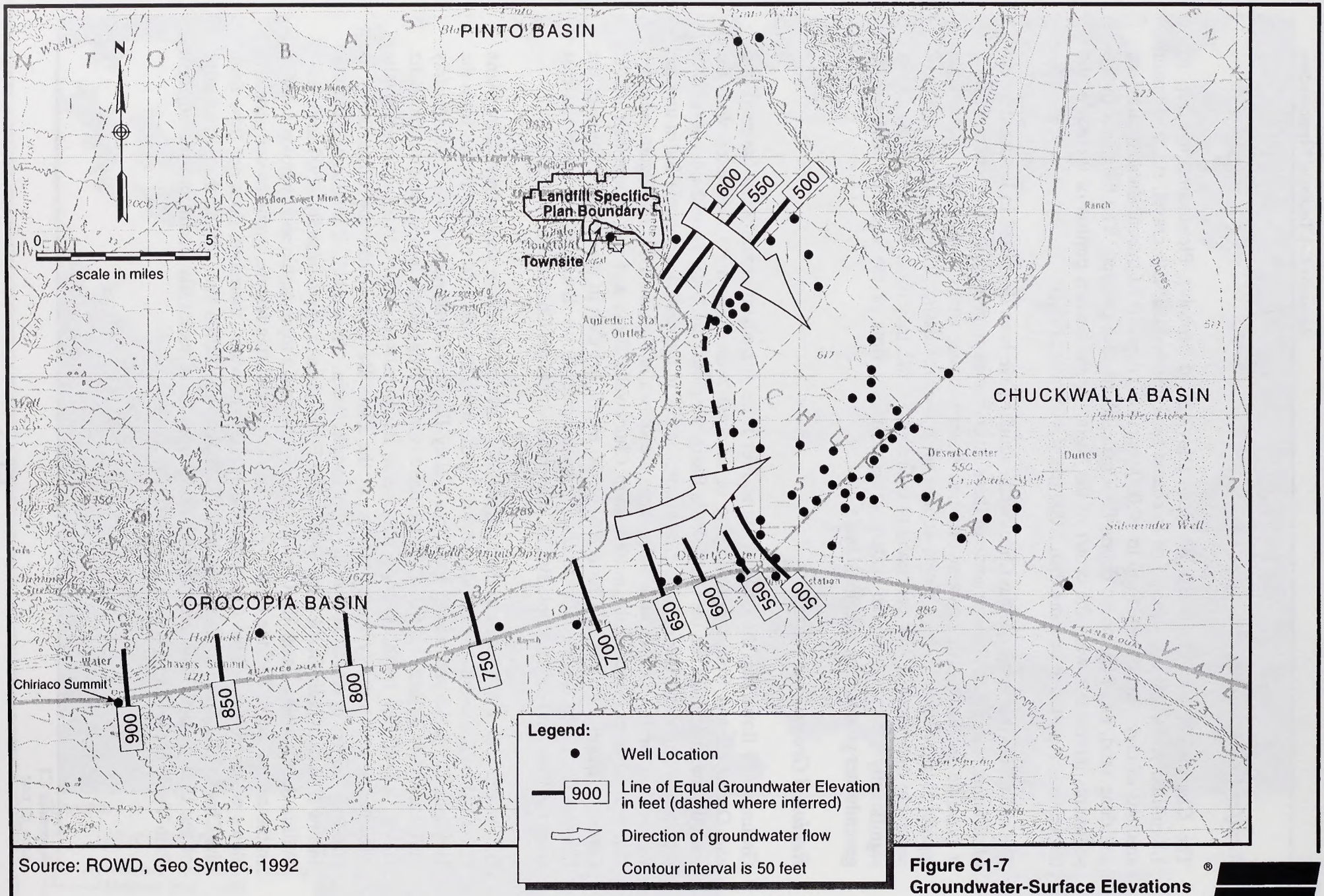
The Chuckwalla aquifer consist of older alluvium of probable Pleistocene age (up to 1.8 million years old) containing fine to coarse sand interbedded with gravel, silt, and lesser amounts of clay. Recent-aged (up to 10,000 years old) deposits of unconsolidated alluvium and dune sand, and Pleistocene debris-flow material are also present. The thickness of the sediments increases toward the center of the basin. In the eastern portion of the basin, the thickness is reported to be more than 2,000 feet (GeoSyntec, 1992).

The sediments that comprise the Chuckwalla aquifer have been deposited in localized layers of different textures. Although some of these layers are more permeable than others, making it possible to distinguish between different water-yielding zones locally, the Chuckwalla aquifer is considered to be a single aquifer on a regional basis. The alternating layers of relatively fine-textured, low-permeability sediments, which may occur in some areas, do not significantly affect the overall pattern of groundwater flow or the aquifer's response to groundwater pumping on a regional basis.

Regional Groundwater Flow

Groundwater flows into the Chuckwalla aquifer from upgradient groundwater basins (Pinto and Orocopia) and from the underlying or adjacent bedrock aquifers associated with the various mountains that rim the Chuckwalla Basin. Regional and local groundwater-level data illustrate this point. Specifically, groundwater levels in the eastern Orocopia Basin and the western and northwestern Chuckwalla Basin are shown in Figure C1-7. The figure indicates that groundwater levels in the northwestern Chuckwalla Basin and the eastern half of the Orocopia Basin (i.e., east of Chiriaco Summit) are higher than in the central portion of the Chuckwalla Basin. Regionally, therefore, groundwater flows downgradient south and east from the Pinto and the Orocopia Basins, respectively, into the Chuckwalla Basin.

Inflow from the Pinto Basin to the northwestern Chuckwalla Basin was estimated by Mann (1986) to be approximately 2,500 ac-ft/yr. To the west, the subsurface contribution from the Hayfield Dry Lake area of the Orocopia Valley Basin was estimated to be approximately 1,700 acre-ft/yr (Mann, 1986). Although there is no hydrogeologic information on the Cadiz Basin, which lies north of the Chuckwalla Basin between the Coxcomb and Granite Mountains, it is roughly the same size as the Pinto Basin and, like the Pinto Basin, is similarly higher in elevation than the Chuckwalla Basin. As a result, it is assumed that the inflow from the Cadiz Basin is the same as the Pinto Basin or approximately 2,500 ac-ft/yr. Within the Orocopia Basin, the Chiriaco Pass forms both a topographic and hydrologic divide in the central portion of the basin. From points west of this feature, groundwater generally flows westward toward the Coachella Valley. Groundwater, therefore, does not flow from the Chuckwalla Basin into the Coachella Valley and the Salton Sea. Along the eastern edge of the Chuckwalla Basin groundwater flows from the Chuckwalla Basin into the adjacent Palo Verde Mesa Basin (Wilson and Owen-Joyce, 1994).



Source: ROWD, Geo Syntec, 1992

Figure C1-7
Groundwater-Surface Elevations in the Chuckwalla Basin
Eagle Mountain Landfill and Recycling Center EIS/EIR

CH2M HILL

Aquifer Recharge

Groundwater recharge refers to the addition or input of water to groundwater. Sources of recharge to the Chuckwalla aquifer include: (1) the subsurface inflow of groundwater from adjacent upgradient groundwater basins (i.e., the Pinto Basin and the eastern Orocopia Basin) and inflow from the saturated bedrock of the surrounding mountains; and (2) either direct precipitation or surface water, that infiltrates into the ground and reaches the water table. This section focuses on the recharge contribution from infiltration; subsurface inflow is discussed in the preceding section.

The amount of direct precipitation that reaches the water table of the Chuckwalla aquifer is small. The greatest contribution from this source occurs principally at the mouths of mountain canyons in the coarse-grained alluvial fan deposits that rim the basin. Mann (1986) suggests that only between 5 and 10 percent of the precipitation that falls in the mountains and subsequently flows down the canyons actually infiltrates through the subsurface and reaches groundwater. Recharge through the sediments in the more central portions of the valley is essentially non-existent because: (1) The sediments are either poorly sorted or are comprised of predominantly fine-textured, relatively low permeability material; (2) groundwater levels are typically several hundred feet below the ground surface creating a thick unsaturated (vadose) zone with a potentially large volume of void space; and (3) water in the vadose zone is vulnerable to loss by evaporation and transpiration because of the prevailing arid climate.

By discounting any infiltration through the sediments in the central portion of the basin, recharge to the Chuckwalla aquifer from adjacent bedrock and the infiltration of runoff through the alluvial fans can be determined from: (1) the area of the surrounding mountains that are within the Chuckwalla Basin watershed; and (2) an estimate of the percentage of rainfall that runs off these mountains and infiltrates through the coarse alluvial deposits both within the canyons and at the edge of the basin. The area of mountains that is within the watershed is determined, from a regional topographic map (U.S. Geological Survey, 1979), to be approximately 290 square miles. Given that the average annual rainfall at the Townsite is approximately 3.5 inches (GeoSyntec, 1992), the total annual recharge to the Chuckwalla aquifer is estimated to be approximately 5,600 ac-ft based on an assumption of 10 percent infiltration. This value is consistent with the estimate of 5,540 ac-ft reported in the previous EIS/EIR (BLM and County of Riverside, 1992). Although the previously reported value is slightly lower than the current estimate, it is considered reasonable to stay with the previous estimate because the method of determining recharge is very approximate, and the difference between the two values (5,600 and 5,540 ac-ft/yr) is very low (approximately 1 percent).

The total average annual recharge to the Chuckwalla aquifer is the sum of the inflow from upgradient basins (approximately 6,700 ac-ft) and the infiltration component identified above (approximately 5,540 ac-ft/yr). The total is 12,240 ac-ft/yr, which is consistent with the range of estimates of between 10,000 and 20,000 ac-ft/yr, reported by James C. Hanson (1992), BLM and County of Riverside (1992), and GeoSyntec (1995).

Environmental Consequences

Significance Threshold Criteria

Significance threshold criteria are measures of environmental change that provide the context for the evaluation of Project-induced environmental impacts. With respect to groundwater resources, significance thresholds are principally developed from regulation-based standards or guidelines and professional judgment, with the latter basis typically employed only when there are no regulatory standards for determining significance. As a general statement, therefore, potential Project-induced environmental impacts are considered significant if the results of the impact do not comply with a particular regulatory requirement.

Appendix G of the California Environmental Quality Act (CEQA) Guidelines identifies several potential consequences of a project that would normally represent a significant effect on the environment. Six of these potential effects are relevant to groundwater quality and use in the Eagle Mountain area because the Chuckwalla aquifer is a local source of water supply:

- Substantial degradation of water quality
- Contamination of a public water supply
- Substantial degradation or depletion of groundwater resources
- Substantial interference with groundwater recharge
- Encouragement of activities that use large amounts of water
- The use of water in a wasteful manner

In addition to these potential impacts identified in the CEQA Guidelines, the potential for ground-surface subsidence caused by groundwater withdrawals is also considered.

Groundwater Quality Significance Criteria

Significance criteria for water-quality related impacts are based on applicable state and federal regulations and requirements for the protection of groundwater quality.

State Water-Quality Requirements. There are several state regulations and requirements pertaining to groundwater quality that are relevant to the proposed Project:

- Article 5, Chapter 15 of Title 23 of the California Code of Regulations (CCR)
- Statement of Policy with Respect to Maintaining High Quality of Waters in California (State Water Resources Control Board [WRCB] Resolution 68-16)
- Water Quality Control Plan for the Colorado River Basin Region of California (Basin Plan)

- Title 22 CCR, Maximum Contaminant Levels in Drinking Water

These regulations and requirements are embodied in the Waste Discharge Requirements (WDRs), which were issued for the proposed landfill by the RWQCB (Order No. 94-036). Although the WDRs will have to be re-issued upon approval of the current EIS/EIR, the provisions contained in the WDRs are the principal basis for defining significance thresholds for groundwater quality, particularly with respect to the landfill. Significance thresholds for impacts to groundwater quality resulting from other Project facilities, including the Townsite, however, are also defined by specific regulations (e.g., Title 22 requirements for defining significance associated with the potential for the contamination of a public water supply).

Federal Water-Quality Requirements. Applicable federal regulations for establishing significance criteria for groundwater quality include monitoring requirements (40 Code of Federal Regulation [CFR] Part 258 Subpart E [Groundwater Monitoring and Corrective Action]); landfill design criteria (40 CFR Part 258, Subtitle D); and water-quality standards (i.e., Safe Drinking Water Act, Maximum Contaminant Levels [MCLs]).

Groundwater-Quality Criteria for the Project. Impacts to groundwater quality would be considered significant if the Project (including the landfill, the associated support facilities, and the Townsite) results in either groundwater-quality degradation or the contamination of a public water supply. In the establishment of significance criteria, groundwater-quality degradation is defined as a detected increase in the concentration of any specified constituent of concern above either: (1) the pre-established background value (to be determined over a 1-year period prior to commencing landfill operations), consistent with the RWQCB Order No. 94-036; or (2) state and/or federal water-quality standards.

The term "detected" is consistent with the language in CCR Chapter 15, Article 5, in which detection occurs when there is "significant statistical or physical evidence of a release from the waste management unit" (§2550.9). Technically, the waste management unit refers only to the landfill. In this TM, however, the definition of detection also applies to the various associated support facilities and the Townsite where substances could be released to the subsurface and degrade groundwater quality.

The other related groundwater quality impact is the contamination of a public water supply. For the purpose of establishing significance criteria, a significant impact would occur if the proposed Project causes a source of potable water (i.e., groundwater) becomes non-compliant with state or federal drinking water standards.

Groundwater Use Significance Criteria

The significance of potential impacts to groundwater resources, other than water-quality degradation, typically can not be based on specific regulatory requirements because such requirements do not exist. Professional judgment is therefore the principal basis for defining significance thresholds for (1) groundwater depletion; (2) groundwater recharge interference;

(3) large water-use encouragement, (4) wasteful water use; and (5) ground-surface subsidence.

Groundwater Depletion. Consistent with CEQA guidelines, if the Project results in a substantial depletion of groundwater resources, the environmental impact would be considered significant. For the evaluation in the EIS/EIR, "substantial depletion" is defined as a decline in current groundwater levels that results in:

- A loss to rights holders of beneficial uses of local groundwater resources,
- A condition of groundwater overdraft,
- The cessation of groundwater-fed water-resource features (e.g., springs, perennial surface-water flows), or
- Degradation of the quality of water pumped from existing wells

Water-Level Decline in Non-Project Wells. A loss of beneficial use of groundwater can be defined in terms of water-level decline in existing, non-Project, wells (i.e., when the water level in a given well drops to a certain point, the rights holder is no longer able to put the groundwater to beneficial use, without deepening the well). The key factor is the amount (depth) of water a well must have to be functional (i.e., provide a means of beneficial use of the groundwater). Based on the physical properties of the Chuckwalla aquifer, and typical pumps and pumping rates in local wells in the vicinity of the Project wells, the minimum depth of water in an existing well for it to be functional is determined to be 40 feet.

Therefore, in the evaluation of potential impacts in the EIS/EIR, a Project-induced loss of beneficial use would occur if Project pumping lowers the static water level in an existing (non-Project) water-supply well to a point where there is less than 40 feet of water remaining in the well. This concept is schematically illustrated in Figure C1-8. The threshold value of 40 feet represents a conservative value that includes a factor of safety of up to 100 percent. Specifically, the threshold value was determined by considering the following conditions and circumstances of current typical groundwater use in the western Chuckwalla Basin:

- The Chuckwalla aquifer in the vicinity of the Project pumping wells is very permeable (i.e., hydraulic conductivity values as high as $1x10^{-2}$ cm/s are reported for the Kaiser wells by BLM and County of Riverside [1992]). The more permeable the aquifer, the smaller the water-level decline (drawdown) in a well when it is pumped (all other factors being equal). Assuming that the nearest non-Project well (4S/15E-16) is representative of other local wells (i.e., a pumping rate of 40 gpm from a 4-inch-diameter well; Correspondence from Larry and Donna Charpied to Tom Peters CH2M HILL [1995]), and a 15 percent aquifer specific yield (Mann, 1986), a hydraulic conductivity of $1x10^{-2}$ cm/s results in a water-level decline in the well

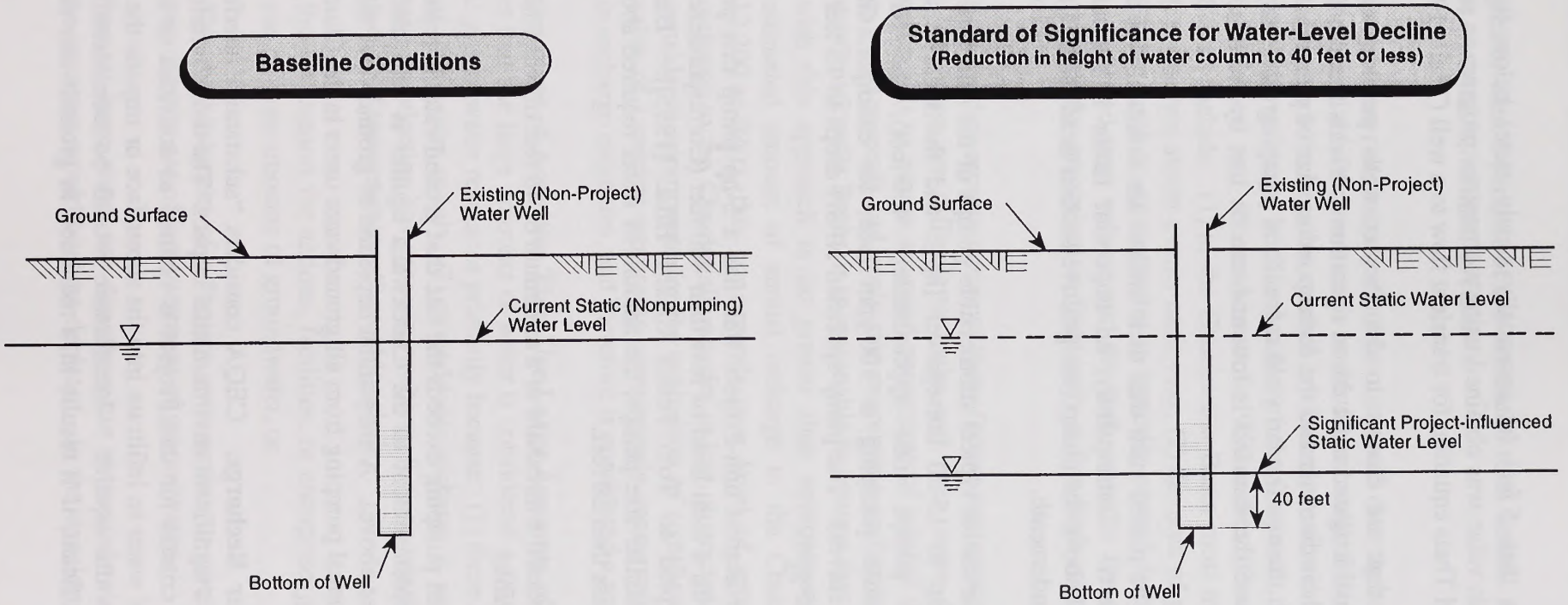


Figure C1-8
Schematic Representation of Standard of Significance for Water-Level Decline in an Existing Well
Eagle Mountain Landfill and Recycling Center EIS/EIR

CH2M HILL

during pumping of less than 5 feet (at essentially steady state) below the static (nonpumping) level. This value was obtained using a computer program to solve the well-known and accepted Theis equation for transient flow to a well (Theis, 1935).

- The non-Project wells that are closest to the Project wells provide water for residential use and/or small irrigated agricultural operations. Yields from these wells are typically limited by their diameter and the corresponding size of pump that can fit in the well (i.e., although the aquifer can yield more, local pumping rates are usually less than 100 gpm because the demand is low and can be met by relatively small submersible pumps).

- Submersible pumps can be placed such that their intakes are essentially at the well bottom (i.e., within 5 feet). Consequently, an important factor is the minimum amount of water required above the pump (net positive suction head [NPSH]), rather than the depth of water underneath.

- Based on performance curves for typical submersible pumps of the size used locally (e.g., 3-inch-diameter; up to 15-20 horsepower [hp]), and the local head (lift) requirements for these pumps (i.e., approximately 450 feet), the NPSH is approximately 25 feet when pumping at 100 gpm (see, for example, Grundfos Model 80S performance curves). The pump-specified NPSH drops to 15 feet or less at pumping rates below 75 gpm.

- It is understood that the nearest non-Project well has a 5-hp pump that produces approximately 40 gpm with a total head of less than 400 feet (Correspondence from Larry and Donna Charpied to Tom Peters CH2M HILL [1995]). Based on performance curves for similar size pumps, the amount of water required above this pump is estimated to be less than 20 feet.

Based on these aforementioned points, a threshold of a minimum of 40 feet of water in a non-Project well is considered reasonable.

Overdraft. Overdraft occurs when pumping exceeds the rate that groundwater is replenished to the aquifer. Groundwater replenishment to the Chuckwalla aquifer is estimated to be approximately 12,200 ac-ft/yr (see above). A substantial depletion of groundwater resources would occur, therefore, if total annual pumping from all groundwater users in the Chuckwalla Basin were to exceed 12,200 ac-ft.

Interference with Groundwater Recharge. CEQA considers "substantial interference" with groundwater recharge to be a significant environmental impact. The term "interference" for the purpose of establishing criteria for this Project is defined as activities or features which either reduce the ability of water to infiltrate into the subsurface or impede the inflow of groundwater to the Chuckwalla aquifer. Interference would be considered to be "substantial", and therefore significant, if it results in a reduction in groundwater recharge

that is greater than 1 percent of the estimated total annual recharge. The rationale for the 1 percent criterion is outlined as follows:

- Groundwater recharge cannot be measured directly and therefore must be estimated. In an arid environment such as the Chuckwalla Basin, recharge is typically low and highly variable because rainfall is similarly low and can fluctuate considerably from year to year (e.g., within 4 miles of the Townsite, the lowest recorded rainfall is 0.31 inches, and the maximum is 9.93 inches [GeoSyntec, 1992]). Contributing factors include: (1) in the Chuckwalla Basin most measurable rain occurs in only a few discrete storm events each year; (2) the area of permeable soil cover is limited; (3) the depth to groundwater is typically several hundred feet; and (4) the available unsaturated pore volume and the high potential for evaporation combine to make it difficult for precipitation from only a few high-intensity events to reach the water table.

- Because data representative of these factors are largely unavailable, accurate estimates of recharge are difficult to make and even more difficult to confirm. Accepted practice is to use an assumed percentage of rainfall that infiltrates to the water table (e.g., 10 percent) and apply this percentage uniformly across the recharge area. For the Chuckwalla Basin, it is reasonable to assume that the level of accuracy associated with this approach is no greater than approximately ±100 ac-ft. Based on the estimated amount of annual recharge to the Chuckwalla aquifer (approximately 12,200 ac-ft/yr), this corresponds to a level of approximately 1 percent. Because recharge to the Chuckwalla aquifer is low, a strict significance threshold criterion is considered appropriate for the evaluation of significant impacts in the EIS/EIR. The value of 1 percent represents an extremely conservative estimate of the level of error in recharge estimates, and therefore is considered a reasonable level of significance.

Encouragement of Activities That Use Large Amounts of Water. The encouragement of activities that use large amounts of water is considered a significant environmental impact to the local groundwater resources primarily because: (1) these resources represent the principal source of local water supply; (2) groundwater recharge is naturally low; and (3) historically, groundwater production has exceeded recharge (i.e., an overdraft condition has occurred). In this evaluation, "encouragement" would include:

- Project support for actions, facilities, or enterprises in the local area that require the use of large amounts of groundwater, or

- The establishment of a Project construction or operational policy or procedure that requires the use of large amounts of groundwater.

The effects of large water use directly relate to groundwater depletion (i.e., if water use is large, the resource would become depleted. In the development of significance criteria, the

water use by the Project will be considered large if groundwater depletion is substantial (see above).

Wasteful Use of Water. Wasteful use of water by the Project is considered to be a significant environmental impact. In developing the significance criteria, wasteful water use would include the specific absence of:

- Consideration and implementation of water conservation measures for water uses required by the Project
- An evaluation of construction, operation and closure activities to ensure that the water requirements are as low as practicable.

Ground-Surface Subsidence. Ground-surface subsidence can occur when subsurface strata compact as a result of groundwater withdrawals that effectively de-water specific compressible geologic units (e.g., clay). Substantial subsidence of the ground surface as a result of Project pumping is considered a significant environmental impact. In this evaluation, "substantial" subsidence is that which results in structural deformation to natural or man-made features (e.g., landfill components, roads, drainage structures, buildings, utilities) that renders these features either unsafe or out of compliance or service.

Groundwater Travel Time From Project Site to the Colorado River

As discussed above, groundwater flows generally southeast from the Project site to the central portions of the Chuckwalla Basin (Figure C1-7). Available water-level data for the eastern Chuckwalla Basin are scarce, but it is understood that groundwater from the Chuckwalla Basin flows eastward through the Palo Verde Mesa Basin to the Palo Verde Basin and eventually to the Colorado River (Figure C1-9). It is therefore conceivable that a pathline of groundwater flow could extend from the Project site to the Colorado River. Potential effects of the proposed Project on the water quality of the Colorado River are evaluated In Section 4.1.2 of the EIS/EIR. An important component of this evaluation is an estimation of the time required for a fluid particle of groundwater to flow from the Project site to the river.

Groundwater travel time is determined by dividing the distance to the river by the velocity of groundwater flow. The velocity, in turn, is determined by applying the concept of Darcy's law in one dimension, which states that the average linear rate of fluid movement is directly proportional to the product of the hydraulic conductivity and the horizontal component of the hydraulic gradient, and inversely proportional to the effective porosity. In this calculation, the principal assumptions underlying this estimate include the following: (1) The horizontal component of hydraulic gradient over the 56 miles between the Project site and the river is approximately 0.002 (i.e., a change in groundwater-level elevation of approximately 475 feet over 56 miles), based on the difference in elevation between the groundwater under the

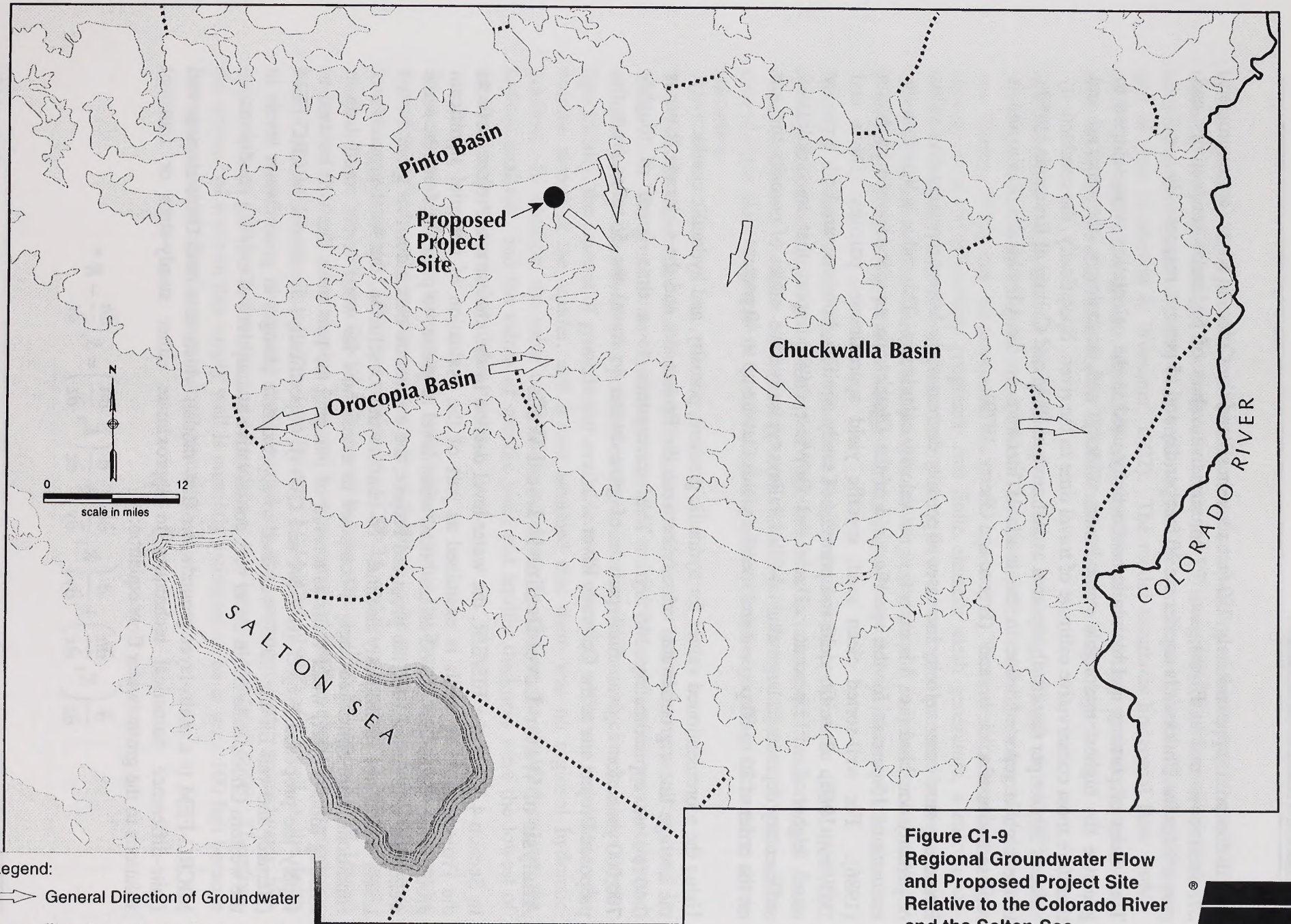


Figure C1-9
Regional Groundwater Flow and Proposed Project Site Relative to the Colorado River and the Salton Sea
Eagle Mountain Landfill and Recycling Center EIS/EIR

CH2M HILL

m115231.T6.20 FLewis20 6/96

landfill footprint (approximately 750 feet above msl) and the Colorado River (approximately 275 feet above msl at Blyth); and (2) conservative values of hydraulic conductivity and porosity for the Chuckwalla aquifer are 30 feet per day and 15 percent, respectively.

The values of porosity and hydraulic conductivity used in the calculation were selected to generate the highest reasonable groundwater velocity, and, accordingly, the quickest and therefore most conservative estimate of travel time to the river. Specifically, the conductivity value of 30 feet per day (ft/d), reported as 10^{-2} cm/s in BLM and County of Riverside (1992), is the highest reported value in the available literature on the Chuckwalla Basin and is representative of a "clean sand" (Freeze and Cherry, 1979).

Because groundwater velocity increases as porosity decreases, the lowest representative value of porosity was used (i.e., 15 percent) in the velocity calculation. This value is based on the estimate of 15 percent for the specific yield of the Chuckwalla aquifer reported by Mann (1986). For well-sorted clean sand, specific yield approximates porosity (Davis and DeWiest, 1966). Specific yield and porosity of sandy aquifers, however, are both typically much higher than 15 percent. Davis and DeWiest (1966) report that unconsolidated sedimentary deposits in large alluvial-filled valleys typically have values of porosity that are on the order of 25 to 60 percent and specific yields that are up to 40 percent.

Using the aforementioned values for hydraulic gradient, porosity, and hydraulic conductivity, the average linear groundwater velocity between the Project site and the Colorado River is 0.40 ft/d or approximately 145 ft/yr. This corresponds to a time frame of roughly 700,000 years for a given fluid particle of groundwater to travel the 56 miles from the proposed Project site to the Colorado River.

Analysis of Water-Level Decline in Local Wells

In Section 4.1.3 of the EIS/EIR, the water-level decline in the closest non-Project wells to the Project pumping wells is examined as part of the evaluation of potential significant groundwater depletion. Based on historical water-level responses to pumping from the same wells that will be used for the proposed Project, the evaluation concludes that groundwater levels would not significantly decline. To confirm this conclusion, the local groundwater conditions were simulated using a computer to assess how far water levels could drop in existing (non-Project) water wells as a result of pumping the two wells that will be used to supply the proposed Project (CW-3A and CW-4). Specifically, the model MICRO-FEM (Hemker and van Elburg, 1995) was used to approximate changes in groundwater levels in the western Chuckwalla Basin under very conservative assumptions of existing conditions.

MICRO-FEM is a multi-layer groundwater flow model, which uses both finite-element and finite-difference numerical techniques to approximate either steady-state or transient solutions to the groundwater flow equation:

$$\frac{\partial}{\partial x}\left(K_x \frac{\partial h}{\partial x}\right)+\frac{\partial}{\partial y}\left(K_y \frac{\partial h}{\partial y}\right)+\frac{\partial}{\partial z}\left(K_z \frac{\partial h}{\partial z}\right)=S_s \frac{\partial h}{\partial t}-R^*$$

In this equation, K_x, K_y, and K_z are the directional components of the hydraulic conductivity tensor, S_s is specific storage, h is hydraulic head, and R* is a general sink/source term which establishes the volume of inflow to or outflow from the system per unit volume of aquifer per unit of time (Anderson & Woessner, 1992). The model simulates horizontal flow within each layer and, although the model is also capable of simulating vertical flow between adjacent layers, the simulation for the EIS/EIR utilized only a single layer.

MICRO-FEM constitutes an integrated groundwater modeling package developed in the Netherlands for micro computers (i.e., PCs). The current version of this package Hemker and van Elberg, 1995) can accommodate up to 16 layers (i.e., vertical discretization). The package consists of multiple programs: two finite element mesh generators, a calculation module for steady state flow and one for transient flow, a combined pre- and post-processor called FeModel, a three-dimensional particle tracking program and some additional utilities. It is capable of modeling saturated, single-density groundwater flow in layered systems.

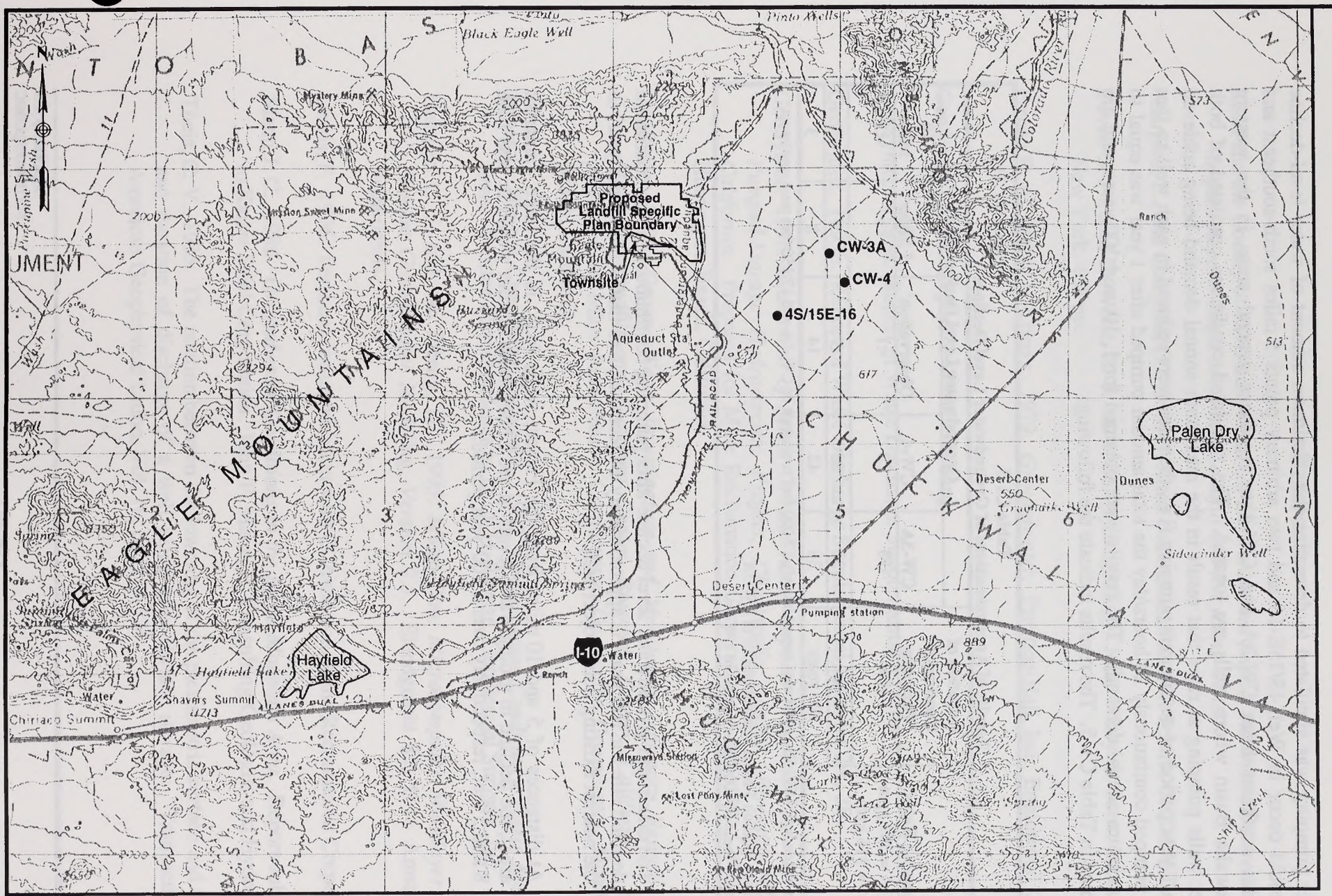
Programs called Femodel (steady-state) and FemCat (transient) perform the calculations for solving the flow equations by means of finite element technique for the horizontal flow components and a finite-difference scheme for flow between adjacent layers. The groundwater flow equation in matrix form is solved iteratively using successive over-relaxation.

The various parameters and associated values used in the simulation are summarized in Table C1-4. The groundwater conditions simulated and the values of aquifer parameters used as input were as conservative as possible to determine the maximum decline in water levels. Specifically, the amount of groundwater available to the pumping wells was restricted to the volume stored in the aquifer, and it was assumed that there was no regional hydraulic gradient. In addition, the value of hydraulic conductivity used in the simulations was the highest available, and the values of specific yield and aquifer thickness were the lowest of their respective ranges of available values.

The nearest non-Project water-supply well (with respect to the Project wells), which serves as a point of reference for monitoring water-level declines in the western Chuckwalla Basin, is located approximately 12,000 feet southwest of CW-3A and approximately 12,350 feet west-southwest of CW-4 (Figure C1-10). This well has the state well designation 4S/15E-16 and is used for domestic water supply. This well is approximately 400 feet deep (Correspondence from Larry and Donna Charpied to Tom Peters, CH2M HILL, 1995), and based on the depth to static water in a monitoring well located on the same property, groundwater was approximately 280 feet below the ground surface at this location in March 1993. Therefore, the amount of water in this supply well is currently estimated to be at least 100 feet because there is no record of an increase in local pumping.

Table C1-4
Principle Parameters and Values Used in the Approximation of Groundwater-Level Declines in the Western Chuckwalla Aquifer

Parameter	Value	Constraint	Rationale
Hydraulic conductivity	0.01 cm/s	Constant in space and time	Based on value for CW-4 presented in initial EIS/EIR. This value is relatively high and represents the highest measured value available for the Chuckwalla aquifer. Using this value produces the most conservative results because the higher the hydraulic conductivity the greater the radius of influence of the pumping wells (and the greater the water-level decline in affected wells).
Specific Yield	0.01	Constant in space and time	Representative of the low range of specific yield for unconfined aquifers, and equivalent to the lowest estimated value for the Chuckwalla aquifer (Mann, 1986). Using this value produces the most conservative results because the lower the value of specific yield the greater the radius of influence of the pumping wells (and the greater the water-level decline in affected wells).
Aquifer thickness	200 feet	Constant in space	Based on well logs of CW-4, CW-1 and CW-2 and CW-3, and is therefore representative of the aquifer thickness in the vicinity of the Project pumping wells. Using this value, which is lower than estimates published by the California DWR produces the most conservative results because the lower the value of aquifer thickness the greater the radius of influence of the pumping wells (and the greater the water-level decline in affected wells).
Pumping rates	CW-3A=369 gpm CW-4=416 gpm	Constant in time; variable by well	Pumping rates represent the amount pumped continuously (24-hours/day) to meet maximum annual demand of 1,266 acre-feet/year. The differences between wells is proportional to the current maximum capacity of each well
Well radius	8 inches	Wells fully penetrate the thickness of the aquifer	Consistent with the construction of the Kaiser CW-series wells.


Proposed Landfill Specific Plan Boundary
Townsite
CW-3A
CW-4
4S/15E-16
Palen Dry Lake
Hayfield Lake
I-10
Desert Center
EAGLE MOUNTAINS
CHUCKWALLA
Pumping station
Water
Ranch
Dunes
Aqueduct Sta Outlet
Black Eagle Well
Pinto Wells
Mystery Mine
Indian Sweet Mine
Buzzard Spring
Graham Well
Sidewinder Well
Lost Pony Mine
Chiriaco Summit
Shavers Summit
Colorado River
Mountain
Spring
Wash
Dunes
Ranch
Water
Well
Spring
Creek
4 LANES DIVD
2 LANES DIVD
RAILROAD
Mayfield
Hayfield Summit Spring
Hayfield Lake
Desert Center
Pumping station
Water
Ranch
Chiriaco Summit
Shavers Summit
Mileage Station
Lost Pony Mine
Rice Gold Mine
Well
Spring
Creek
Dunes
Ranch
Water
Well
Spring
Wash
Mountain
Spring
Dunes
Graham Well
Sidewinder Well
Colorado River
Mystery Mine
Indian Sweet Mine
Black Eagle Well
Pinto Wells
Aqueduct Sta Outlet

Project pumping was simulated to determine the maximum amount of water level-decline that could occur in Well 4S/15E-16 and two arbitrary points 5 miles south-southeast and 10 miles southeast from CW-3A and CW-4 to represent general areas in the western Chuckwalla Basin where wells are located. The simulated conditions consisted of both Project wells pumping at rates that result in the maximum annual demand being achieved over a 1-year period of continuous pumping (i.e., the rates were reduced in each well so that when pumped continuously 24 hours/day the total amount pumped after 1 year was equal to the maximum annual demand). The results were obtained for 1, 10, and 100 years, and are presented in Table C1-5. The results indicate the following:

Table C1-5
Results of Approximations of Groundwater Level Declines

Pumping Rates	Duration of Continuous Pumping	Groundwater Level Decline (feet)				
		CW-3A	CW-4	Observation[1]	5 Miles[2]	10 Miles[3]
CW-3A = 369 gpm CW-4 = 416 gpm	1 year	18	22	<1	<1	<1
	10 years	23	28	3	<1	<1
	100 years	38	42	14	8	3

[1]Observation well (4S/15E-16) located approximately 12,000 feet southwest of CW-3A and 12,350 feet west southwest of CW-4.
[2]Arbitrary location 5 miles south-southeast of CW-3A
[3]Arbitrary location 10 miles southeast of CW-3A

- The maximum groundwater level decline after pumping continuously at the maximum demand rate for 100 years is approximately 14 feet (i.e., less than 2 inches per year) in the nearest existing non-Project well.

- At distances of 5 and 10 miles from the Project wells (e.g., in the Lake Tamarisk area), the decline in groundwater levels in the Chuckwalla aquifer would be less than 8 and 3 feet, respectively over a 100-year period.

References

BLM and the County of Riverside, 1992. *US Environmental Impact Statement/Environmental Impact Report: Eagle Mountain Landfill and Recycling Center.*

Charpied, L., and Charpied, D. 1995. Written communication to T. Peters, CH2M Hill.

Davis, S. N., and DeWiest, R. J. M. 1966. *Hydrogeology.* John Wiley & Sons, New York New York. 463 pp.

Freeze R. A., and J. A. Cherry. 1979. *Groundwater.* Prentice-Hall, Inc., Englewood Cliffs, NJ. 604 pp.

GeoSyntec. 1992. Report of Waste Discharge.

GeoSyntec. 1993a. Report of Waste Discharge Supplemental Volume 1.

GeoSyntec. 1993b. Report of Waste Discharge Supplemental Volumes 2A, 2B.

GeoSyntec. 1995. *Evaluation of Select Ground-Water Impacts Proposed Eagle Mountain Pumped-Storage Hydroelectric Project, Chuckwalla Aquifer, Riverside County, California.* Prepared for Mine Reclamation Corporation. GeoSyntec Consultants, Huntington Beach, California.

GeoSyntec 1996. *Ground-Water Investigation and Monitoring Summary Report, Eagle Mountain Landfill and Recycling Center, Riverside County, California.* Report submitted to Mine Reclamation Corporation. GeoSyntec Consultants, Huntington Beach, California.

James C. Hanson Consulting Engineers. 1992. *Groundwater Condition - Eagle Mountain Area.* Written correspondence to Dr. J. H. Birman, Geothermal Surveys, Inc.

Hemker, C. J. and van Elburg, H. 1995. *Micro-Fem, Microcomputer Multilayer Finite Element Groundwater Modeling, Version 2.5.* Elandgracht 83, 1016 Amsterdam, Netherlands.

Lewis, F. 1996. Personal communication with O. Anderson, Mine Reclamation Corporation.

Mann J. C. 1986. *Groundwater Conditions in the Eagle Mountain Area.* Report submitted to Kaiser Steel Corporation. John F. Mann, Jr. Consulting Geologist and Hydrologist.

Theis, C. V., 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater storage: Transactions of American Geophysical Union, Vol. 16, pp. 519-524.

U.S. Environmental Protection Agency. 1991. *Delineation of Wellhead Protection Areas in Fractured Rocks.* EPA 570/9-91-009. Groundwater Protection Division, Office of Groundwater and Drinking Water Washington D.C. 144 pp.

U.S. Geological Survey 1986. *Buzzard Spring, California, Riverside County 7.5 Minute Series (Topographic) 33115-G4-TF-024.* Scale 1:24,000.

Wilson, R. P., and S. J. Owen-Joyce. 1994. *Method to Identify Wells that Yield Water That will be Replaced by Colorado River Water in Arizona, California, Nevada, and Utah.* US Geological Survey Water Resources Investigations Report 94-4005. 36 pp.

Appendix C-2
Technical Advisory Panel Report

Report of the

TECHNICAL ADVISORY PANEL

for the Proposed

EAGLE MOUNTAIN LANDFILL

Riverside County, California

A Report Prepared by:

Dr. David E. Daniel
Dr. Robert M. Koerner
Dr. Geoffrey R. Martin
Dr. George Tchobanoglous
Dr. David Keith Todd

Prepared For:

Mine Reclamation Corporation
960 Tahquitz Canyon Way, Suite 204
Palm Springs, CA 92262

April 25, 1994

Table of Contents

	Page
Introduction	1
Background of Project	1
Purpose of Technical Advisory Panel	2
Evaluation of the Eagle Mountain Landfill Project	3
Adequacy of Information Developed	3
Suitability of the Site for a Landfill	3
Design of the Landfill	5
Primary Leachate Collection Layer	5
Primary Composite Liner	6
Base of Landfill	6
Side Slopes	7
Unsaturated Zone Liquid Monitoring Layer	8
Secondary Composite Liner	8
Final Cover System	9
Slope Stability Analyses	9
Monitoring	10
Vadose Zone Liquid Monitoring System	10
Vadose Zone Gas Monitoring System	11
Surface-Water Monitoring System	11
Ground-Water Monitoring System	11
Perimeter Gas Monitoring System	12
Tunnels	13
Summary and Conclusions	13
Appendix — Brief Biographical Sketches of Members of the Technical Advisory Panel	16
Figure 1 — Liner and Cover Systems	19
Figure 2 — Materials for Liner and Cover Systems	20
Figure 3 — Monitoring Systems	21

INTRODUCTION

Background of Project

The Eagle Mountain Landfill is a proposed solid waste disposal facility that will receive up to 20,000 tons per day of nonhazardous, municipal solid waste from Southern California. Waste will be transported to the Eagle Mountain Landfill site primarily by rail; some waste from local communities may be trucked to the site, as well. The facility will occupy a site that was formerly used by Kaiser Steel for open-pit mining of iron ore.

The site is located in an arid region that receives about 3 to 4 inches of rainfall per year. The potential for leachate production by the landfill was quantified by Dr. Robert Ham, Professor of Civil Engineering at the University of Wisconsin, Madison, and an internationally recognized authority on landfill decomposition and leachate generation. Ham's analysis shows no potential for leachate production from the landfill on a regular basis. Ham found that small amounts of leachate may be generated intermittently, but this occasional leachate production will be due to precipitation falling directly on the leachate collection system or the first layer of refuse during filling operations.

Although there is no potential for generation of substantial quantities of leachate at the site, the landfill has been conservatively designed as though there were such a potential. The landfill will be lined with a composite geomembrane/clay lining system and leachate collection/removal system. Added redundancy in the form of a second composite liner and unsaturated zone liquid monitoring layer will be added in the relatively flat, bottom areas of the landfill where leachate (if there were any leachate) would accumulate and would be pumped out of the landfill for treatment. A composite geomembrane/clay liner will also be used on side slopes. The final cover system will consist of a geomembrane liner overlain by 3 ft of earthen material.

An unsaturated zone gas monitoring system will be installed beneath the entire landfill footprint. The system will consist of a series of gas extraction probes buried beneath the liner on

a grid pattern. Upgradient and downgradient wells will track ground-water quality at the landfill site.

Purpose of Technical Advisory Panel

The Technical Advisory Panel (TAP) for the Eagle Mountain Landfill was formed in 1992. The purpose of the TAP is to advise the landfill owner (Mine Reclamation Corporation) and principal design engineer (GeoSyntec Consultants) on issues concerning siting, characterization of the site, characterization of the materials to be used in constructing the landfill, design of the landfill, design of monitoring systems, closure of the landfill, and other technical issues concerning the landfill.

The members of the TAP include Dr. David E. Daniel, who is an authority on use of clays and other low-permeability soils for landfill liners and covers, Dr. Robert M. Koerner, who is an authority on the use of geosynthetics in landfills, Dr. Geoffrey R. Martin, who is an authority on seismicity and seismic design of earthen structures, Dr. George Tchobanoglous, who is an authority on environmental aspects of landfills and solid waste management, and Dr. David Keith Todd, who is an authority on ground water and ground-water monitoring. Biographical information on these individuals is provided in the Appendix to this report.

The TAP has been consulted, both individually and as a group, during the design process to seek ideas and suggestions. We were asked to inform the owner and designer of any problems that should be addressed, to let the owner and designer know if there are any fundamental problems that would preclude the development of the site for a landfill, and to comment upon draft and final documents developed for the project.

The purpose of this report is to summarize the conclusions and recommendations of the TAP concerning the Report of Waste Discharge (ROWD) and supplemental information recently generated in support of the ROWD.

EVALUATION OF THE EAGLE MOUNTAIN LANDFILL PROJECT

Adequacy of Information Developed

The Eagle Mountain Landfill has been extensively studied and characterized. Particular attention has been paid to evaluation of the seismicity of the site, the potential for active faulting at the site, and the determination of ground-water conditions beneath the site. These studies, in the opinion of the TAP, provide sufficiently detailed information about the site to enable conclusions to be drawn about whether the site can be safely developed for a solid waste landfill.

The analyses performed in support of the landfill design (particularly slope stability analyses) are well documented. The design drawings and supporting documentation are sufficiently complete to enable one to determine whether the design is adequate and whether the landfill can safely contain solid waste at this site.

The monitoring systems for the site include a vadose zone liquid monitoring system, a vadose zone gas monitoring system, and a network of ground-water monitoring wells. The design of the gas and liquid sampling points, and location of sampling points, are presented in sufficient detail to enable one to assess whether these systems will serve their intended purpose. The ground water at the site has been characterized in sufficient detail to evaluate whether the site can be adequately monitored.

In short, the TAP feels that the site has been characterized sufficiently, and the design documented with adequate detail, to permit a rigorous and thorough evaluation of the suitability of the site and proposed landfill. We do not feel that further information is needed to draw conclusions about the technical suitability and safety of this site or the proposed landfill.

Suitability of the Site for a Landfill

Based upon the information examined by the TAP, the proposed site appears to be nearly ideal for a solid waste landfill. The reasons why this site is considered to be nearly ideal are summarized as follows:

- The facility will be located in an arid region where there is essentially no potential for sustained production of leachate — the fact that there will be no sustained production of leachate makes the design of engineering systems that will safely protect ground water relatively simple and straight-forward.
- Transportation systems will be constructed that will provide access to major population centers — the landfill will serve a large and important population base in southern California and will have the capability of serving the local community, as well.
- The size of the facility offers advantages of scale, which are important not only in terms of economics but also in a technical sense because on large landfill projects it becomes possible to perform very thorough and detailed site characterization studies, design analyses, construction inspection, and monitoring. Also, it is much more feasible to manage landfill gas efficiently at a large landfill than a small one. It is the experience of the TAP members that on small landfill projects, the overall quality of site characterization, design, and construction inspection is not on a par with that of large, sophisticated projects such as Eagle Mountain.
- From information reviewed by the TAP, the site appears to be free from any major geologic hazards, including historic landslides and active faults.
- The development of the site will lead to reclamation of lands that have been altered from mining operations — the TAP applauds efforts that result in restoration of mined-out lands and productive use of by-product materials such as tailings.
- The sparse population in the surrounding area is ideal for minimizing aesthetic impacts upon neighbors.

No significant negative aspects of the site were identified by the TAP. The extremely low rainfall at the site (and attendant lack of production of leachate), coupled with effective leachate management systems within the landfill, preclude any reasonable probability of adverse impact upon ground water at the site.

Based upon the technical attributes just discussed, the TAP members fully endorse the proposed site for a landfill.

Design of the Landfill

The landfill is expected to produce essentially no leachate. Once a single layer of solid waste covers the leachate collection system, there should be virtually no further opportunity for leachate production. Thus, the liner and leachate collection systems represent redundant safeguards that in all probability will not be challenged to serve their intended purpose. Nevertheless, the liner and leachate collection systems have been designed using state-of-the-art materials and design concepts to collect and remove leachate in quantities that far exceed the amounts of leachate that are anticipated.

A cross-sectional sketch of the liner and cover systems is presented on Figure 1, and the characteristics of the various materials that will comprise these systems is shown on Figure 2.

Primary Leachate Collection Layer

The primary leachate collection layer consists of a minimum 18-in.-thick layer of gravel (maximum particle size of 1.5 in.) on the base of the landfill and a variable but much thicker layer of gravel on the landfill side slopes. On the side slopes, the thickness of the primary leachate collection layer increases with depth (Figure 1) to maintain stable slopes during construction. The leachate collection layer will have a hydraulic conductivity $\geq$ 1 cm/s on the base and $\geq$ 0.01 cm/s on the side slopes. A material with a lower hydraulic conductivity can be used on the relatively steep side slopes because gravity will tend to drive leachate down-gradient much more easily on slopes than on the base of the landfill.

The leachate collection layer is both thicker and higher in hydraulic conductivity than many leachate collection layers at landfills located in far more humid regions. The leachate collection layer has been designed conservatively — it should be capable of handling leachate quantities far in excess of the amount expected at the Eagle Mountain Landfill.

The use of drainage corridor gravel, rather than the perforated pipes that are commonly used in landfills, is applauded. The gravel should be fully capable of conveying quantities of liquid far in excess of the volume of liquid that is anticipated, and the gravel has no risk of deteriorating or crushing over time.

On the base of the landfill, the primary leachate collection layer will be overlain by an 18-in.-thick protection layer composed of processed overburden that has a hydraulic conductivity $\geq 1 \times 10^{-4}$ cm/s. The protection layer provides assurance that underlying layers (including the leachate collection layer and primary liner) will not be damaged by waste or construction equipment. The requirement that the hydraulic conductivity be $\geq 1 \times 10^{-4}$ cm/s should ensure that the protection layer does not significantly impede downward migration of leachate into the underlying leachate collection layer. The thick, granular leachate collection layer on the side slopes has more than adequate drainage capacity and is thick enough in its own right to serve as a protection layer for the underlying liner system.

The base of the leachate collection layer is separated from the underlying primary geomembrane liner with a 16 oz/yd^2 nonwoven geotextile, which serves as a "cushion" to protect the geomembrane from puncture. This nonwoven geotextile should be more than adequate to protect the underlying geomembrane from puncture by the stones (up to 1.5 in. in diameter) contained within the primary leachate collection layer.

Primary Composite Liner

The primary liner is a composite geomembrane/clay liner on both side slopes and the base of the landfill.

Base of Landfill. The composite liner on the base consists of an 80-mil textured (both sides) high density polyethylene (HDPE) geomembrane underlain by 24 in. of compacted, low-permeability ($k \leq 1 \times 10^{-7}$ cm/s) soil. The geomembrane component of the primary composite liner should contain nearly all the leachate that comes into contact with it, except at isolated locations containing a small imperfection in the geomembrane (for instance, a slight flaw in a welded seam). The low-permeability compacted soil liner serves to greatly restrict downward

movement of liquid through any imperfections in the geomembrane. Together, a geomembrane and low-permeability soil layer form a composite liner, which is the best available type of liner for landfills.

Side Slopes. The composite liner on the side slopes consists of an 80-mil HDPE geomembrane (textured on bottom, smooth on top) overlying a geosynthetic clay liner (GCL). The GCL will be the type that contains a layer of bentonite mixed with an adhesive and attached to a sheet of HDPE. Thus, the side-slope liner will consist of an 80-mil HDPE liner that is underlain by the bentonite component of the GCL, which in turn is underlain by the HDPE component of the GCL. In effect, the side-slope liner is a three-component composite liner.

A GCL is preferred to compacted soil because compacted soil liners must be placed and compacted at relatively high water contents: on side slopes, the wet soil liner would not be as stable as the dry GCL. Further, properly placing and compacting soil liners on relatively steep side slopes, such as those at the Eagle Mountain site, is not practical. The GCL should provide more than adequate protection from release of leachate through any imperfections in the primary geomembrane liner located on side slopes.

One of the TAP members, Dr. David Daniel, has worked with the design engineer to develop appropriate criteria for the GCL and to check assumptions and design parameters employed for the GCL. Dr. Daniel is in full concurrence with the proposed use of a GCL at the Eagle Mountain Landfill.

It is appropriate that the designer has used a primary geomembrane on side slopes that is textured on the base but smooth on top. Leaving the upper surface of the geomembrane smooth should minimize the possibility of undesirable shearing stresses being transmitted to the liner system. Also, the bentonite component of the GCL will be sandwiched between two geomembranes, which should ensure that the bentonite remains dry and strong, except at those very limited areas where there is an imperfection in the overlying or underlying geomembrane. The designer has carefully considered all possible mechanisms by which the bentonite component of the GCL could absorb moisture, and the TAP is in agreement with the conclusion

drawn by the design team that the bentonite sandwiched between two geomembranes should stay dry over most of the area of the landfill.

On the side slopes, the geomembrane component will be placed on foundation soil. The subgrade will not contain stones larger than 0.4 in. to ensure that there is virtually no danger of the geomembrane component of the GCL becoming punctured by stones.

Unsaturated Zone Liquid Monitoring Layer

On the base areas of the landfill, a 12-in.-thick layer of gravel with a hydraulic conductivity ≥ 0.1 cm/s will underlie the low-permeability soil liner component of the primary liner. The unsaturated zone liquid monitoring layer is of more than adequate thickness and hydraulic conductivity to serve its intended purpose. The probability of any leachate being detected in this layer is very low. However, water that is squeezed out of the overlying compacted soil liner as waste is placed above the liner will drain into the unsaturated zone liquid monitoring layer. Within a few years after a landfill cell is filled, the consolidation process in the soil liner should cease, and flow rates within the unsaturated zone liquid monitoring layer should progressively decrease.

The TAP applauds the designers for including this unsaturated zone liquid monitoring layer, and the underlying secondary liner, which represent extra components beyond those required by federal law for solid waste landfills. The unsaturated zone liquid monitoring layer provides further redundancy and safety in the most critical area of the landfill (i.e., the base, where any leachate that is generated would tend to flow and accumulate prior to removal).

Secondary Composite Liner

On the base areas of the landfill, a composite liner will underlie the unsaturated zone liquid monitoring layer. The composite liner will consist of an 80-mil textured (both sides) HDPE liner on top of a GCL (bentonite component facing upward, geomembrane component facing downward). The geomembrane component of the GCL will also be textured on both sides. This liner is a three-component composite liner. The composite liner is expected to serve its intended purpose very well.

Final Cover System

The final cover system will consist from top to bottom of (1) a 24-in.-thick erosion layer formed from processed overburden or excavated bedrock; (2) a 12-in.-thick protection layer (maximum particle size of 1.5 in.); (3) a 12 oz/yd^2 nonwoven geotextile cushion; (4) a 40-mil very low density polyethylene (VLDPE) geomembrane; and (5) a foundation layer. Because the region is so dry, granular soil is the only feasible material to use for the erosion layer. The protection layer and geotextile should provide adequate puncture protection for the underlying geomembrane. The VLDPE geomembrane is a good choice for the final cover — the VLDPE has excellent elongation properties and should be able to stretch without tearing in areas where localized differential settlement occurs. A clay layer is not included within the final cover, but clay would be pointless considering the dryness of the site.

The TAP strongly believes that the final cover design is appropriate for the conditions at the site.

Slope Stability Analyses

The stability of slopes was identified by the TAP as a critical issue very early in the TAP review process. The design engineer has performed extensive and sophisticated studies aimed at (1) characterizing the strength properties of all relevant materials and interfaces; (2) analyzing the factor of safety under static conditions; (3) determining appropriate seismic inputs for analysis; and (4) analyzing the stability of the landfill under seismic loading.

The slope stability work covered a broad range of analyses (both two- and three-dimensional analyses), a range of loading conditions (short-term, long-term, and seismic conditions), and a range of construction stages (from open, just-constructed cells to closed landfill). The analyses were performed for a range of seismic events. An extensive laboratory test program provided critical information. The analyses go well beyond the minimum state and federal requirements and represent one of the most sophisticated and thorough slope stability analysis programs ever undertaken for a landfill.

The TAP has not reviewed the analyses in detail, but several members have evaluated various facets of the analysis procedures and assumptions. No flaws in the analyses or assumptions have been identified. It is the TAP's understanding that a detailed review of the slope stability analyses was performed by the California Department of Water Resources. Also, one of the TAP members, Dr. Geoffrey Martin, was closely involved in characterizing the appropriate seismic inputs for the seismic stability analyses.

The TAP has no reason to doubt the conclusion of the designers that the slopes should remain stable under static conditions and should only undergo tolerable, relatively small deformations under design seismic loading conditions. The owner of the landfill has retained one of the world's most knowledgeable and capable landfill design firms, and within that firm, they have committed several of their best engineers to extensive study of the slope stability issue. The owner and designer obviously took the question of slope stability very seriously, and, from the information provided us, appear to have adequately and properly addressed questions concerning slope stability. The TAP believes that in terms of laboratory testing and design analyses, no more could have been done to ensure that slopes are stable.

Monitoring

Five types of monitoring systems are planned for the site: (1) a vadose zone liquid monitoring system; (2) a vadose zone gas monitoring system; (3) a surface-water monitoring system; (4) a ground-water monitoring system; and (5) a perimeter gas monitoring system. These five systems are sketched on Figure 3 and are discussed individually below. Extensive air quality monitoring is also planned, but review of the air monitoring was beyond the scope of the TAP.

Vadose Zone Liquid Monitoring System. The vadose zone liquid monitoring system will consist of a 12-in.-thick layer of processed overburden or coarse tailings having a hydraulic conductivity of 0.1 cm/s or greater, and underlain by a geomembrane/GCL composite liner. Pipes will be used to pump any free liquid that occurs in the vadose zone liquid monitoring system out of the system. The vadose zone liquid monitoring system will be located directly

beneath the bottom composite liner (Figure 3), which is the only portion of the landfill where it is physically possible for liquids to accumulate.

Vadose Zone Gas Monitoring System. The vadose zone gas monitoring system will consist of gas monitoring probes installed at discrete locations beneath the landfill liner system (Figure 3). Each probe will consist of a 10-ft-long section of slotted pipe that has a nominal outside diameter of 1 in. Solid pipes will be connected to monitoring stations outside at the ground surface. The probes will be located on a grid, approximately 660 ft in width, throughout the entire landfill. The ROWD contains a detailed plan for sampling the gas probes and for analyzing the gas samples.

The TAP is pleased to see that a vadose zone gas monitoring system has been incorporated in the landfill design. Although such a system probably is not needed (given the dryness and remoteness of the site), the system adds another level of assurance that the landfill has been designed and will be operated to protect the subsurface environment

Surface-Water Monitoring System. A surface-water monitoring system will be used to monitor the quality of surface water in the vicinity of the landfill. Nine surface-water monitoring points will be installed along natural and man-made drainage courses. Five of the nine monitoring points will be used for background monitoring. Although the risk of impacts to surface water is remote, it is prudent and appropriate that the quality of the surface water be determined.

Ground-Water Monitoring System. The ground-water monitoring system for the Eagle Mountain Landfill will consist of 27 downgradient point-of-compliance monitoring wells and 9 upgradient background monitoring wells. The wells will consist of 6-in.-diameter stainless steel screens surrounded by a sand filter pack. The screens will be 50 to 90 ft long and will be installed with the top of the screen located about 10 ft below the current water table position to minimize corrosion potential. The TAP does not see any problem with placement of the screened sections of monitoring wells below the water table, as proposed.

The fractured bedrock aquifer beneath the site has been extensively investigated by test drilling, core analyses, and test pumping of wells. As a result, the TAP members strongly believe that the fractured bedrock can be treated as an ordinary porous medium (because the spacing of fractures is small compared to depth of ground water) and that the aquifer can be safely and adequately monitored.

The rationale for placement of ground-water monitoring wells was reviewed in detail by Dr. David K. Todd of the TAP and was found to be sound. The key elements of the ground-water monitoring program are as follows. Each well will be screened in the uppermost saturated zone beneath the project site. Point-of-compliance monitoring wells will be placed at the downgradient boundary of the landfill at locations designed to monitor ground water that has flowed: (i) beneath each of ten leachate collection systems sumps included in the landfill design; (ii) beneath natural canyons within the landfill footprint; and (iii) along the alignment of the steeply-dipping, non-active bedrock faults of the site.

It can always be argued that no matter how many ground-water monitoring wells are proposed, that more wells would provide useful information. However, at this site, the potentiometric surface is comparatively smooth, the monitoring requirements are fairly straightforward, and the risk of ground-water contamination is extremely remote. The TAP members feel that the proposed ground-water monitoring system is more than adequate to detect any unforeseen problems with ground-water contamination that might develop at this site.

Perimeter Gas Monitoring System. Both shallow and deep gas monitoring probes will be installed around the perimeter of the landfill (Figure 3). The shallow probes will be 10 ft deep. Additional probes will be installed at various depths, which will depend upon the maximum depth of waste within 1,000 ft of the probe. At a given sampling point, the deepest perimeter gas monitoring probe will be embedded to a depth equal to the maximum depth of waste found within 1,000 feet of the probe location. The TAP believes that this system is more than adequate to monitor soil gas at the perimeter of the site.

Tunnels

A series of interconnected tunnels was excavated from 1966 to 1972, during operation of the Kaiser Eagle Mountain Mine. The tunnels underlie the landfill footprint in the southeastern portion of Phase 2 of the Eagle Mountain Landfill. There are two issues: (1) will the added stresses from the landfill cause significant deformation or collapse of any of the tunnels, and (2) will any operations to strengthen the tunnels disrupt or displace the California leaf-nosed bat, which is apparently present in some or all of the tunnels? The designer has considered the stresses imposed on the tunnel, and the ability of the hard rock around the tunnels to arch stresses around the openings. The designer's conclusion that no strengthening of the tunnel is needed so long as there are at least 2 tunnel diameters (about 25 ft) of rock overlying the tunnel seems reasonable. Strengthening of the tunnels will be required only near the portals of the tunnels. The actual procedure to deal with strengthening the portals will depend on whether the bats are still present at the time that the work would be done. Waiting to see what the actual conditions are before making a final decision about how to strengthen the portals seems wise at this point.

SUMMARY AND CONCLUSIONS

The proposed Eagle Mountain Landfill will be one of the largest and most sophisticated nonhazardous, solid waste landfills anywhere in the world. The information provided to the Technical Advisory Panel (TAP) concerning the landfill is extensive and detailed. While it has not been possible for the members of the TAP to study each and every detail of the Report of Waste Discharge (ROWD) and supporting documents, we have studied the documents in sufficient detail to determine (1) whether enough information has been assembled to draw informed conclusions about the site and the landfill, (2) whether there are any fundamental flaws in the site or landfill design that should preclude using the site for a landfill, and (3) whether the landfill can safely contain waste without significant risk of damage to ground water or subsoils at the site. In addition to the overall studies by the TAP indicated above, the individual members of the TAP have investigated discrete components of the landfill design in more detail, including:

- Dr. David Todd — ground-water flow system and ground-water monitoring network
- Dr. David Daniel — liner system components
- Dr. Geoffrey Martin — seismic stability of the landfill.

The TAP members feel that the site has been adequately characterized to determine whether it is suitable for a landfill. The TAP members believe that the site is nearly ideal for a landfill. The low rainfall at the site makes it virtually impossible for leachate to be produced on a sustained basis, and the landfill will lead to reclaiming of waste by-products and mined-out land. Geologic hazards, including surface faulting, appear to be nil at the site. Ground-water conditions have been defined and the ground water can be monitored properly. The TAP could identify no technical reason why the site could or should not be developed for a landfill. To the contrary, the site has numerous attributes that make it an excellent choice for a solid waste landfill.

The design of the landfill is in all respects state of the art. The designers have used a double composite liner on the base of the landfill and a triple-component composite liner on side slopes. Drainage layers that should be able to handle quantities of leachate that are far in excess of those that could reasonably be anticipated at the site have been designed. Exhaustive studies of strength properties, and interfacial strength properties, as well as slope stability analyses, have been performed in an effort to provide assurance that slopes will be stable. The TAP feels that the design is just about as safe as it possibly could be. The TAP cannot envision any further analyses to perform or technical attributes that the designers could add to significantly enhance the waste containment capabilities of the landfill. Should this landfill be permitted and constructed, the waste containment system at the Eagle Mountain Landfill will likely become a benchmark and a standard by which other landfills in California and neighboring states will be judged.

The monitoring systems at the Eagle Mountain Landfill are designed to monitor essentially everything worth monitoring: liquid in the vadose zone beneath the primary liner in the base of the landfill (where leachate would accumulate, if any leachate is generated), soil gas

beneath the entire landfill area (in case there are unexpected releases of landfill gas), ground water beneath the site, and surface water. The TAP feels that the monitoring plan is adequate and has no suggestions that would materially improve the monitoring program at the site.

In summary, the proposed Eagle Mountain Landfill is located at an arid site with virtually no potential for prolonged generation of leachate. The landfill has been designed to contain and remove any leachate that is generated and to monitor the site for any unforeseen releases of gases or liquids into the vadose zone, ground water, or surface water. The members of the TAP have been able to identify no significant flaws in site characterization, design of the landfill, or design of monitoring systems. The TAP feels that the designers have done essentially all that is humanly possible to make this a safe landfill that will be protective of ground water, surface water, and the underlying and surrounding environment. Given the favorable site conditions, sophisticated waste containment systems, and elaborate monitoring systems, the proposed Eagle Mountain Landfill could well become one of the world's safest landfills and a model for others to emulate.

APPENDIX

BRIEF BIOGRAPHICAL SKETCHES OF MEMBERS OF THE TECHNICAL ADVISORY PANEL

David E. Daniel is the L.B. Meaders Professor of Civil Engineering, University of Texas, Austin, Texas. Dr. Daniel received his Ph.D. in civil engineering at the University of Texas in 1980 and has focused most of his work on compacted clay liners and geosynthetic clay liners used for landfill liners and covers. He edited the book *Geotechnical Practice for Waste Disposal*, has taught in nearly 100 continuing education courses (including more than 25 sponsored by the U.S. EPA) dealing with design and construction of landfills, co-authored the EPA's technical guidance document *Quality Assurance and Quality Control for Waste Containment Facilities*, and is currently Editor-in-Chief of the American Society of Civil Engineer's *Journal of Geotechnical Engineering*. Dr. Daniel served as chairman of the TAP in coordinating preparation of this report.

Geoffrey R. Martin is a Professor of Civil Engineering and Assistant Director [Engineering Applications] of the Southern California Earthquake Center, University of Southern California, Los Angeles, California. Dr. Martin received his Ph.D. in civil engineering at the University of California at Berkeley in 1965. Following a 12-year career as a Professor of Civil Engineering at the University of Auckland, New Zealand, he joined the Earth Technology Corporation in Long Beach, California, in 1977 as Manager of Earthquake Engineering and in 1980 became Vice President for Engineering. In 1990, Dr. Martin joined the University of Southern California and focused his efforts on seismic evaluation of sites and seismic design of structures, landfills, and foundations. Dr. Martin has performed seismic hazard and design studies for the Puente Hills, Calabasas, Scholl Canyon, and Spadra Landfills of the Los Angeles County Sanitation Districts and has studied the seismic response of the Operating Industries Inc. (OII) landfill in Los Angeles, the Bee Canyon Landfill in Orange County, and extensions to the

Puente Hills Landfill. Dr. Martin has performed detailed investigations of the seismicity of the Eagle Mountain Landfill site.

Robert M. Koerner is the R. L. Bowman Professor of Civil Engineering and Director of the Geosynthetic Research Institute (GRI), Drexel University, Philadelphia. Dr. Koerner received his Ph.D. from Duke University and for the past 10 years has directed GRI, which is the world's largest government- and industry-funded research and development institute dedicated to geosynthetic materials. The majority of GRI's work relates to landfills. Dr. Koerner authored the widely-used textbook *Designing with Geosynthetics*, has taught in over 200 continuing education courses on design and testing of geosynthetic materials (including more than 25 courses sponsored by the U.S. EPA), has developed industry-accepted standards for testing geosynthetic materials (published as GRI test methods), and has co-authored the EPA's technical guidance document *Quality Assurance and Quality Control for Waste Containment Facilities* as well as EPA's geosynthetic design guidance manual for landfill cells and surface impoundments.

George Tchobanoglous is a Professor of Environmental Engineering, University of California at Davis. Dr. Tchobanoglous received his Ph.D. from Stanford University in 1969 and has been authored 6 textbooks used in more than 200 colleges and universities in the subject areas of solid waste management, environmental engineering, wastewater treatment, water quality, and the collection and pumping of wastewater. His work on solid waste management has won particular acclaim, and he has extensive experience with landfills throughout California and the nation. He is a past president of the Association of Environmental Engineering Professors and a past Member of the California Waste Management Board. Dr. Tchobanoglous wrote the widely used and often cited book *Integrated Solid Waste Management, Engineering Principles and Management Issues.*

David Keith Todd is President of David Keith Todd Consulting Engineers, Inc., Berkeley, California, and Professor Emeritus of Civil Engineering at the University of California, Berkeley. Dr. Todd received his Ph.D. in civil engineering from the University of California, Berkeley, California, and began a career of teaching and research at Berkeley immediately

thereafter. In 1978 Dr. Todd formed his consulting firm, which specializes in ground-water resources planning, development, management, and protection. He has worked on hundreds of ground-water projects throughout the world and has written more than 115 technical publications in the field of hydrology and ground-water resources. He authored one of the most widely used books on ground water, *Groundwater Hydrology*. In addition, Dr. Todd edited *The Water Encyclopedia* and *Polluted Groundwater*. Dr. Todd has worked closely with the owner and designer in evaluating ground-water conditions beneath and around the Eagle Mountain Landfill, in determining whether the ground water can be adequately monitored, and in evaluating requirements for ground-water monitoring wells.

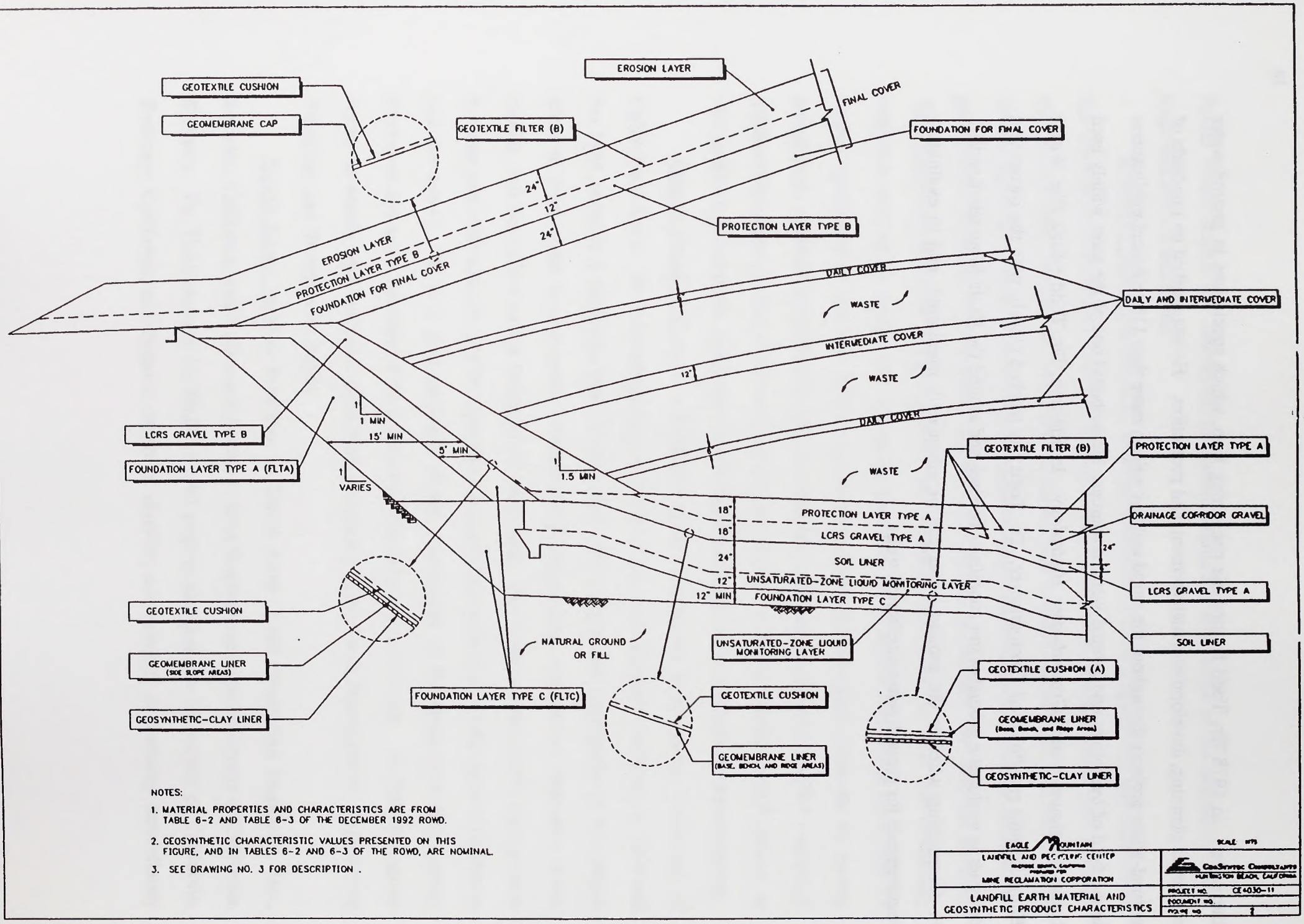


Figure 1 — Liner and Cover Systems

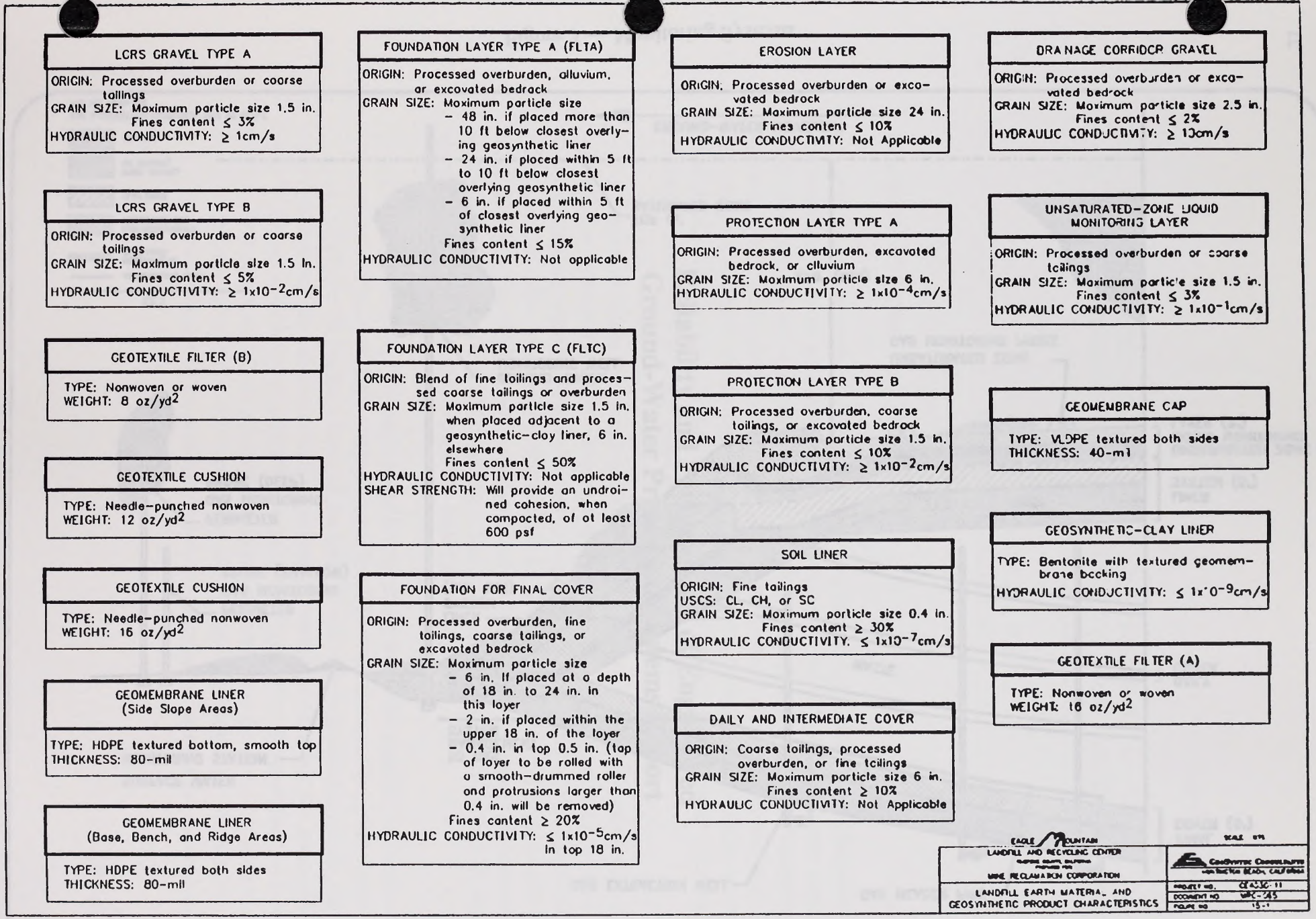


Figure 2 — Materials for Liner and Cover Systems

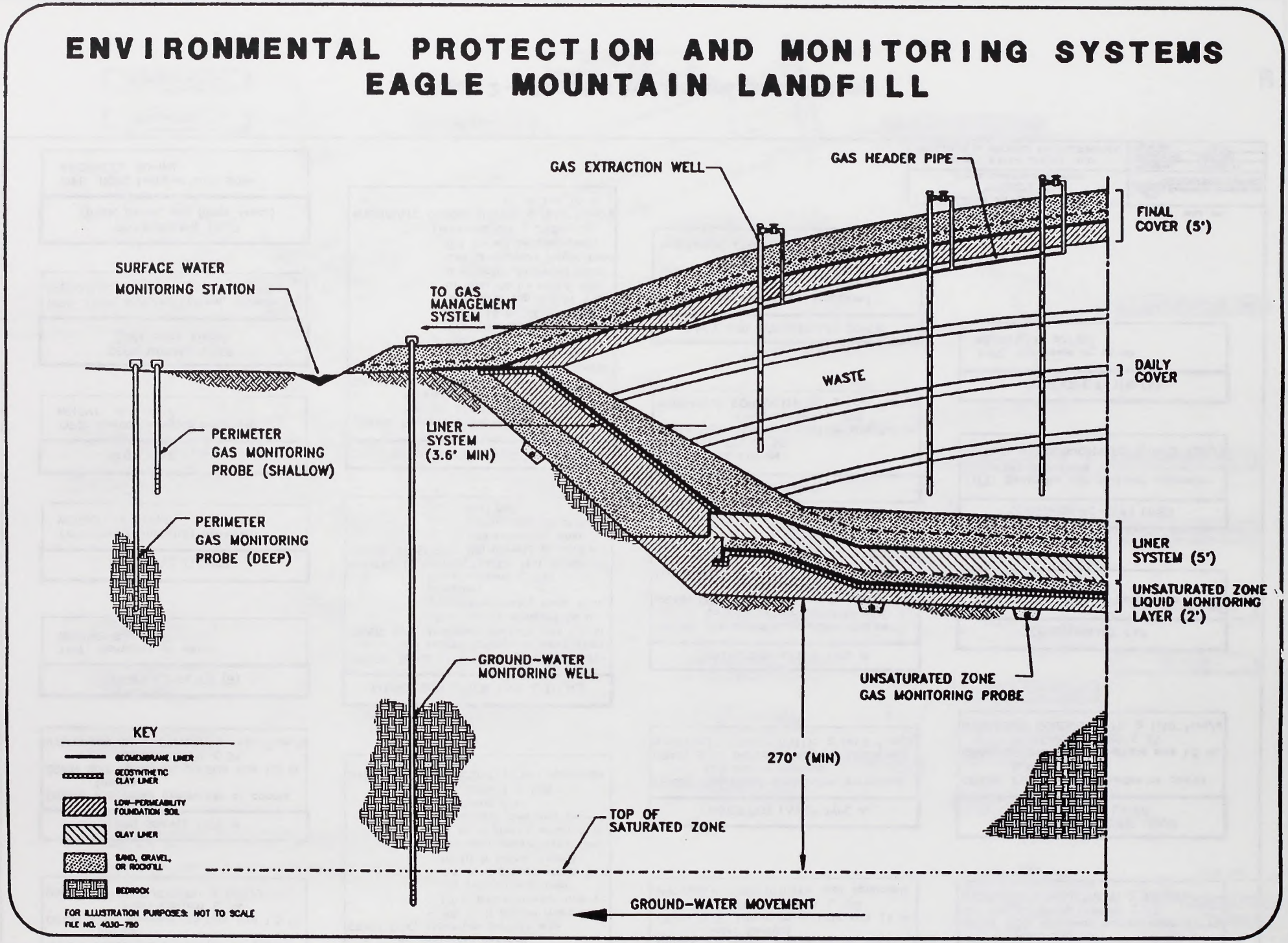


Figure 3 — Monitoring Systems

Appendix C-3
Reliability and Performance of Engineered Ground-Water Protection Systems Report

RELIABILITY AND PERFORMANCE OF ENGINEERED GROUND-WATER PROTECTION SYSTEMS EAGLE MOUNTAIN LANDFILL

by
Rudy Bonaparte, Ph.D., P.E.
GeoSyntec Consultants

Description of Systems

The Eagle Mountain Landfill will include engineered systems for the containment and collection of the by-products of municipal solid waste (MSW) decomposition; these by-products are leachate and landfill gas. The systems designed for the Eagle Mountain Landfill are in full compliance with State and Federal solid waste regulatory requirements. In fact, the systems proposed for the Eagle Mountain Landfill, when constructed, will be more extensive and more protective of ground water than the systems currently in use at any Class III landfill in the State.

A Report of Waste Discharge (ROWD) for the first four phases of development of the Eagle Mountain Landfill was prepared in 1992, with two supplements in 1993. These documents contain detailed information on the design of the engineered systems for the landfill. The development of a ROWD for Phase 5 of the landfill is planned for a future date. That ROWD will include a landfill design having the same engineered systems as the first four landfill phases. The engineering systems described in the existing ROWD for the Eagle Mountain Landfill include:

- *Liner System:* The liner system for the Eagle Mountain Landfill will consist of a composite liner overlain by a leachate collection and removal system (LCRS). In the base areas of the landfill (i.e., the bottom areas of canyons and pits having slopes 3H:1V (horizontal:vertical) or flatter), the composite liner will consist of a HDPE geomembrane liner with a nominal thickness of 80 mils underlain by a low-permeability soil liner with hydraulic conductivity of not more than 1 x 10^{-7} cm/s and a thickness of at least 2 ft. A secondary liner system will be installed below this composite liner system in the base

areas of the landfill. The secondary liner will consist of an 80-mil thick HDPE geomembrane underlain by a geosynthetic clay liner (GCL) with a hydraulic conductivity no larger than 1×10^{-9} cm/s. In essence, the base areas of the Eagle Mountain Landfill will be underlain by a double-composite liner system. This type of system is extremely effective in containing leachate, and it provides a containment capability well in excess of that required by regulation.

In the side slope areas of the landfill (i.e., the areas of the landfill having slopes steeper than 3H:1V), and in the bench and ridge areas of the landfill (i.e., the areas above the base having slopes of 3H:1V or flatter), the composite liner will consist of a HDPE geomembrane liner with a nominal thickness of 80 mils underlain by a geosynthetic-clay liner (GCL) with a hydraulic conductivity of not more than 1×10^{-9} cm/s.

- *LCRS:* The LCRS will be composed of a granular blanket drain (drainage layer) with a minimum slope of 4 percent. In the base areas of the landfill and in bench and ridge areas, the drainage layer will consist of an 18-in. thick layer of coarse gravel with a hydraulic conductivity of at least 1 cm/s. In the side slope areas of the landfill, the LCRS will consist of a single layer of coarse sand and gravel at least 3 ft thick with a hydraulic conductivity of at least 1×10^{-2} cm/s. The LCRS drainage corridors will be constructed at the low points of major graded canyon areas. The drainage corridors will be constructed using coarse gravel material with a hydraulic conductivity of at least 10 cm/s. Liquids in the LCRS drainage layer will flow to the drainage corridors which, in turn, will convey the liquids to one of 12 LCRS sumps located at the lowest points within the landfill footprint (ten sumps for the first four phases of landfill development and two sumps for the fifth phase). Dedicated submersible pumps placed in side slope risers at the low point of the sumps will be used to remove liquid that drains into the LCRS sumps. The pumps will operate when sufficient liquid is available to allow for proper pump operation. Even though only one is needed, two side slope risers will be installed in each sump to provide redundancy, additional capacity, and the ability to flush the sumps in the unlikely event it is ever necessary.

- *Active Gas Extraction System:* An active gas extraction system will be used to remove landfill gas generated by MSW decomposition. The active gas extraction system will consist of more than 1,200 gas extraction wells placed within the waste mass (approximately 1,000 wells for the first four phases of landfill development and at least 200 wells for the fifth phase). Construction of the active gas extraction system will occur progressively as waste filling advances. The active gas extraction system will be operated under a small vacuum (i.e., less than atmospheric pressure), which will promote gas flow from the waste mass towards the gas extraction wells.

- *Final Cover System:* The final cover system for the Eagle Mountain Landfill will consist of a 40-mil thick polyethylene geomembrane cap resting on a 2-ft thick foundation for final cover layer. The upper 18 in. portion of the foundation for final cover layer will have a hydraulic conductivity no greater than 1 x 10^{-5} cm/s. The geomembrane cap will be overlain by a nonwoven geotextile cushion layer, a 1-ft thick soil protection layer, and a 2-ft thick erosion layer consisting of cobble- and boulder-sized material.

Construction of Systems

The construction of the engineered systems for the containment and collection of leachate and landfill gas at the Eagle Mountain Landfill is described in the detail in the existing ROWD. The discussion presented below is excerpted from Section 6.2 of that document.

Grading of the base areas (i.e., the bottom areas of canyons and pits where the landfill slopes will be 3H:1V (horizontal:vertical) or less) of the Eagle Mountain Landfill will be performed to alter the existing topography so that the landfill can be constructed. Grading in base areas will include excavation and placement of engineered fill. Excavation of on-site bedrock materials will be performed using localized, controlled blasting. Alluvial deposits will be excavated using conventional earth moving equipment (i.e., bulldozers, scrapers, etc.). Once base grading is complete,

the base liner system will be installed. This will be accomplished using conventional landfill liner system materials and installation methods.

The side slope areas of the landfill are those areas having slopes steeper than 3H:1V. Foundation grading of the side slope areas will extend from the edge of the base areas to the crests of benches and ridges. Foundation grading in side slope areas will primarily involve: (i) clearing and grubbing; (ii) excavation of bedrock and residual soil deposits, if any; and (iii) placement of engineered fill on the bedrock slopes. Bedrock excavation will be performed using conventional controlled blasting techniques. Residual soils will be excavated using conventional earth moving equipment.

After excavation is performed, side slopes will be developed in 30-ft high increments (each increment being termed a "level"). This procedure involves placing foundation soil in horizontal lifts up to the top of the level being constructed and then cutting the foundation soil back to achieve the required foundation grade for that level. After the foundation soil is cut back, the liner system geosynthetics will be installed and the LCRS gravel for that level will be placed. A detailed step-by-step procedure for installation of the side slope liner system is presented on ROWD Drawing Nos. 28 through 34. This procedure is applicable to steep canyon side slopes and the steep slopes present in the East Pit. It is noted that the steps in this procedure for side slope liner system construction have been used to varying degrees for liner system construction at existing landfills in the greater Los Angeles area, including the Bee Canyon Landfill, Lopez Canyon Landfill, Puente Hills Landfill, Azusa Landfill, and Bradley West Landfill.

Interim grading of the Eagle Mountain Landfill will be performed as the landfill is progressively developed. Landfill access roads will be constructed and extended as necessary to maintain access to the active areas of the landfill. On-site earth materials will be used to construct the landfill access roads. The roads will be graded to provide a minimum driveable width of 40 ft, and a maximum slope of seven percent. Interim cover will be placed over exposed waste during landfill operations. Interim cover provides control of odors, vectors, and litter, as well as infiltration from precipitation. On-site earth materials will be used for interim cover. Areas with interim cover will be sloped to promote surface-water run-off.

Interim and permanent surface-water management system features will be constructed as the landfill is progressively developed. These features include: (i) interim detention basins; (ii) interim downchutes; (iii) interim swales; (iv) bench ditches; (v) channels; (vi) side-slope spillways; and (vii) berms. On-site earth materials will be used to construct these features. Interim and permanent surface-water drainage control features will be constructed with materials designed to resist erosion under anticipated flow conditions.

Final slopes of the landfill will be graded at an average inclination of 3.5H:1V. Local slope inclinations will be 3H:1V with a 20-ft wide bench at 40-ft vertical increments. Final cover benches will be sloped toward the landfill at three percent, with slopes of two percent along the bench alignments. Final landfill access roads will be constructed to provide access onto the landfill for maintenance of the final cover, surface-water management system, and gas management system. Final cover access roads will be graded to provide a minimum driveable width of 40 ft, will slope into the final landfill cover at about three percent, and will slope up the final landfill cover at about seven percent.

Final surface-water management system features will be constructed during final grading. These features include: (i) downchutes; (ii) swales; (iii) final cover benches; and (iv) final cover access road channels. The final cover system, final landfill access roads, surface-water management system, and gas management system will be constructed using conventional landfill construction materials and practices.

The Eagle Mountain Landfill will contain five phases, which together define the waste management unit. The landfill phases will be contiguous with one another. Each phase of the landfill will be subdivided into subphases to facilitate construction of the liner system and to optimize site operations. Each subphase will be on the order of 10 to 40 acres in plan area. Subphases will be progressively developed from the lower elevations to the higher elevations of each phase. Daily landfilling operations within each subphase will take place in daily landfill cells ranging from about 3 to 10 acres in size, depending on incoming waste quantities.

The construction described above will be implemented in conjunction with implementation of a rigorous construction quality assurance (CQA) program. This CQA program is described in Section 9 of the ROWD.

Reliability and Performance

Extensive information exists in the form of research results and data from operating landfills to demonstrate that the types of engineered systems proposed for the Eagle Mountain Landfill above, when constructed using the installation procedures and CQA program described in the ROWD, are very reliable and capable of achieving very high levels of performance (in terms of leachate and gas containment and collection) at MSW landfills. The remainder of this document presents a discussion on the data and information that support these statements.

The potential volumes and characteristics of leachates and landfill gas generated at modern MSW landfills are well understood. Information on landfill gas characteristics and volumes and characteristics have been reported by Barlaz and Ham [1993] and Tchobanoglous et al. [1993], for example. Data on leachate flow volumes from 26 landfill cells have been presented by Bonaparte et al. [1995], while MSW characteristics from 14 modern MSW landfills have been reported by Bonaparte [1995] and Bonaparte and Othman [1995]. The data presented in these and other references provide a clear basis for establishing MSW leachate and landfill characteristics.

With respect to leachate generation, it should be noted that the Eagle Mountain Landfill site is very arid, having an average annual rainfall of less than 4 in. Due to the aridity of the site, the potential for leachate generation at the landfill is extremely limited. For design, the potential for leachate generation at the Eagle Mountain Landfill site was evaluated using the U.S. Environmental Protection Agency (USEPA) computer model "Hydrogeologic Evaluation of Landfill Performance." As reported in Section 4.5.3 of the ROWD: "the results of the analyses for both interim and final landfill configurations indicate no leachate generation over the five year simulation period. In addition, the results show no increase in waste moisture content after five years, indicating that simulations for longer periods of time likely would give the same

result". The ROWD also notes that these analysis results are consistent with the evaluation of leachate generation potential at the Eagle Mountain Landfill undertaken by Professor Robert Ham of the University of Wisconsin, Madison, a noted authority on the potential for leachate and gas generation at landfills. The results of Professor Ham's evaluation are presented in Appendix A of the ROWD [Ham, 1990]. His analysis considered the specific conditions likely to exist at the Eagle Mountain Landfill site. From the analysis, he concluded that the arid conditions at the landfill site and the limited moisture content of incoming waste at the bottom of the landfill "... preclude leachate generation on a regular basis at the bottom of the landfill." Professor Ham also indicated that leachate may be generated intermittently, but only due to precipitation falling directly on the LCRS or on the first few feet of waste during the beginning of landfill operations in a particular area. Leachate generated under these conditions would be very dilute and this condition would occur for only a short period of time.

The results of Ham's evaluation and the computer analyses performed during preparation of the ROWD are consistent with information found elsewhere. For example, in Section IV.A of the preamble (56 FR 50991) to Federal MSW regulations (40 CFR §258), USEPA stated: "These data indicate that little leachate is generated in areas where the precipitation does not exceed 25 inches annually, which suggests that precipitation is an indication of the potential for a landfill to contaminate ground water." Similarly, Keenan [1986] stated: "In general, landfills receiving at least 750 mm rainfall are expected to eventually produce leachate. In more arid regions receiving less than approximately 325 mm rainfall, landfills may never produce leachate because the combined effects of run-off, evaporation, and evapotranspiration will be so great as to yield zero net infiltration." These statements indicate that for the Eagle Mountain Landfill, where the annual rainfall is less than 4 in., little or no leachate will be produced.

As indicated above, extensive information exists for establishing the likely volume and characteristics of leachate and landfill gas at the proposed Eagle Mountain Landfill. Similarly, extensive information exists on the performance capabilities of composite liners of the type proposed for the Eagle Mountain Landfill. Studies of the performance of composite liners have been presented by Faure [1984], Sherard [1985],

Fukuoka [1986], Brown et al. [1987], USEPA [1987], Jayawickroma et al. [1987], Bonaparte et al. [1988], Giroud and Bonaparte [1989], Giroud et al. [1992], and Bonaparte and Giroud [1995]. The excellent performance characteristics indicated by these studies have been confirmed through field monitoring of composite liner performance by Bonaparte and Gross [1990, 1993], Feeney and Maxson [1993], and Workman [1993]. Most recently, Bonaparte et al. [1995] presented operational data for 26 landfill cells containing composite liners incorporating GCLs. The conclusion of their data evaluation is: "*The data shown in Table 4 suggest that the true hydraulic efficiency of a composite liner incorporating a GCL may be greater than 99.90 percent. A liner with this efficiency, when appropriately used as part of an overall liner system, can provide a very high degree of liquid containment capability*" (emphasis added).

Not only do composite liners provide a very high level of liquid containment, but their components, namely compacted layers of low permeability soil and HDPE geomembrane liners, are also very durable. With respect to soil liners, Bonaparte [1995] recently stated:

> "Research related to soil liners has focused on identifying construction methods to achieve low field hydraulic conductivity (Day and Daniel, 1984; Daniel, 1987; Hermann and Elsbury, 1987), evaluating test methods for hydraulic conductivity measurement in both the field and laboratory (Olson and Daniel, 1981; Daniel et al., 1985; Sai and Anderson, 1990; Trautwein and Williams, 1990), investigating the effects of leachate permeation on soil properties (Daniel and Liljestrand, 1984; Bowders and Daniel, 1987; Mitchell and Madsen, 1987; Pierce et al., 1987; Fernandez and Quigley, 1991; Quigley et al., 1988) and evaluating chemical diffusion rates through soil liners (Barone et al., 1989; King et al., 1993; Johnson et al., 1989; Rowe et al., 1988; and Shackelford and Daniel, 1991a,b). *Results from this research have been used to establish a state-of-practice in which soil liners may be constructed to achieve the desired properties with confidence that, in most design situations, leachate will not adversely affect the properties of the liner*" (emphasis added).

With respect to HDPE geomembrane liners, Bonaparte [1995] provided the following commentary:

"Research results for geosynthetic materials used in landfills have been reported in the national and international conferences held on this subject, in journals such as *Geotextiles and Geomembranes, Geosynthetics International*, and in research reports from EPA and others. Early research, as summarized in EPA (1988), focused on evaluating the physical and mechanical properties of geosynthetics, their permeabilities and diffusivities with respect to water and a range of chemicals, and their environmental stability with respect to a range of potential in-situ exposure conditions. More recent research has focused on high density polyethylene (HDPE), by far the type of geomembrane most widely used in landfill liner system applications in the U.S. Under certain conditions, some formulations of this material may exhibit the phenomenon of brittle fracture at low stress levels (i.e., environmental stress cracking). Research has been aimed at developing test methods to evaluate stress crack potential (Halse et al., 1990a,b; Koerner et al., 1992), and developing design methods and field installation techniques to maintain geomembrane stresses within allowable limits (Berg and Bonaparte, 1993; Giroud, 1984a; Giroud et al., 1993; Koch et al., 1988; Peggs and Carlson, 1989). Other research has involved the assessment of chemical diffusion rates through geomembranes (August and Tatzky, 1984; Britton et al., 1989; Haxo and Lahey, 1988; Haxo et al., 1987; Ramsey, 1993) establishing test methods for "fingerprinting" geomembrane resins (Landreth, 1990; Mores et al., 1990), developing improved methods for seaming HDPE geomembranes (Hessel and John, 1987; Peggs and Carlson, 1990; Carlson et al., 1993), evaluating the puncture resistance of geomembranes (Frobel et al., 1987; Heerten, 1993; Wilson-Fahmy et al., 1994), and developing new geomembrane products having properties that may make them attractive for specific applications. *As with soil liners, research results for geosynthetics have been used to establish a state-of-practice in which these materials can be effectively used." ..."Based on available information, the service life for an HDPE geomembrane used as a component of a liner system in an appropriately designed and constructed MSW landfill*

should be in excess of the time period for leachate and gas production (see Figures 1 and 2); the available information suggests that the service life of this material will be measured in terms of hundreds of years (Haxo and Haxo, 1988; Koerner et al., 1992; Landreth, 1990)" (emphasis added).

Leachate collection and removal systems of the type proposed for the Eagle Mountain Landfill have also been shown to be very reliable when properly designed. Research into the potential for clogging of LCRSs in landfills has been considered by, for example, Bass et al. [1983], Rohde and Gribb [1990], and Koerner and Koerner [1989; 1990a,b; 1991]. These studies indicate that the potential for clogging depends on the amount and composition of leachate and on the details of the design of the leachate collection system. It appears that, for biological clogging to occur, the following two conditions need to exist:

- inadequate design of the sand or geotextile filter; and/or
- large rate of leachate production from the landfill.

The first condition is mitigated by properly designing the sand or geotextile filter. The design of sand or geotextile filters is a straightforward exercise, and there is extensive information in the technical literature on geotextile filter design [Giroud, 1982; Christopher and Holtz, 1985; Giroud, 1988; Koerner, 1990; Christopher and Fischer, 1991; Luettich et al., 1991].

The second condition for biological clogging of filter layers in landfills relates to the rate of leachate generation. The lower then leachate generation rate, the lower the potential for clogging (other factors being equal). As previously discussed, the potential for significant sustained leachate generation at the Eagle Mountain Landfill is very low.

Notwithstanding the lack of leachate generation, the LCRS has been conservatively designed to rapidly convey large leachate flows to sumps. The LCRS has been designed to have a minimum base slope of four percent to promote efficient drainage. This slope is twice the minimum value typically used at landfills. The LCRS on the

base of the landfill has also been designed with a minimum hydraulic conductivity of 1 cm/s, which is 10 to 100 times larger than the LCRS hydraulic conductivity typically required at landfills. The main LCRS drainage corridors will be constructed of permeable coarse gravel rather than pipes. In this application, gravel is being used to eliminate any questions over the structural stability of pipes under the large compressive loads imposed by the waste that will overlie the LCRS. The gravel drainage corridors will have an inherently low potential for clogging, given the large cross-sectional area of the corridor and the porous, permeable nature of the gravel. Another design detail intended to minimize the potential for clogging involves the placement of a protective cover soil layer and geotextile filter layer between the waste and LCRS. Lastly, the LCRS sumps have been designed so that they can be flushed to remove sediment and other matter, if ever necessary.

The final engineered component of a modern MSW landfill addressed in this document is the cover system. Federal and State regulations require that new MSW landfills underlain by a composite liner be designed to include a composite cap. The Eagle Mountain Landfill design includes this type of cap. This type of final cover system can virtually eliminate infiltration into a landfill and can be maintained for as long as needed [Bonaparte, 1995]. USEPA [1991] has recognized that final cover systems can virtually eliminate infiltration into a landfill when they stated:

> "Minimizing leachates in a closed waste management unit requires that liquids be kept out and that the leachate that does exist be detected, collected, and removed. Where the waste is above the ground-water zone, a properly designed and maintained cover can prevent (for practical purposes) water from entering the landfill and, thus, minimize the formation of leachate."

Detailed technical guidance on the design of landfill final cover systems can be found in EPA [1991], Daniel [1993], and Othman, et al. [1995], for example.

Findings of Technical Review Board

In 1992, Mine Reclamation Corporation (MRC), the operator/owner of the Eagle Mountain Landfill, convened a technical advisory panel (TAP) to advise the company and the landfill design team on the design of the Eagle Mountain Landfill. The members of the TAP are:

- Dr. David E. Daniel, Professor of Civil Engineering at the University of Texas, Austin, an authority on the use of clays and other low-permeability soils for landfill liners and covers;

- Dr. Robert M. Koerner, Professor of Civil Engineering at Drexel University and Director of the Geosynthetic Research Institute, an authority on the use of geosynthetics in landfills;

- Dr. Goeffrey R. Martin, Professor of Civil Engineering at the University of Southern California and Assistant Director of the Southern California Earthquake Center, an authority on seismicity and seismic design of earthen structures;

- Dr. George Tchobanoglous, Professor of Environmental Engineering at the University of California, Davis, and former member of the California Integrated Waste Management Board, an authority on leachate and gas generation in landfills; and

- Dr. David K. Todd, President of David Keith Todd Consulting Engineers, Inc., and Professor Emeritus of Civil Engineering at the University of California, Berkeley, an authority on ground-water flow and monitoring.

The TAP was consulted, both individually and as a group, during the design process. They were asked to evaluate the design and identify any issues they felt needed to be addressed. They were also asked to prepare a report summarizing their conclusions and recommendations concerning their review of the ROWD and supplemental information generated in support of the ROWD. The TAP issued their

report in May 1994. Conclusions of the TAP report relevant to this report are given below.

"The design of the landfill is in all respects state of the art. The designers have used a double composite liner on the base of the landfill and a triple-component composite liner on side slopes. Drainage layers that should be able to handle quantities of leachate that are far in excess of those that could reasonably be anticipated at the site have been designed. Exhaustive studies of strength properties, and interfacial strength properties, as well as slope stability analyses, have been performed in an effort to provide assurance that slopes will be stable. The TAP feels that the design is just about as safe as it possibly could be. The TAP cannot envision any further analyses to perform or technical attributes that the designers could add to significantly enhance the waste containment capabilities of the landfill. Should this landfill be permitted and constructed, the waste containment system at the Eagle Mountain Landfill will likely become a benchmark and a standard by which other landfills in California and neighboring states will be judged."

"The monitoring systems at the Eagle Mountain Landfill are designed to monitor essentially everything worth monitoring: liquid in the vadose zone beneath the primary liner in the base of the landfill (where leachate would accumulate, if any leachate is generated), soil gas beneath the entire landfill area (in case there are unexpected releases of landfill gas), ground water beneath the site, and surface water. The TAP feels that the monitoring plan is adequate and has no suggestions that would materially improve the monitoring program at the site."

"In summary, the proposed Eagle Mountain Landfill is located at an arid site with virtually no potential for prolonged generation of leachate. The landfill has been designed to contain and remove any leachate that is generated and to monitor the site for any unforeseen releases of gases or liquids into the vadose zone, ground water, or surface water. The members of the TAP have been able to identify no significant flaws in site characterization, design of the landfill, or design of monitoring systems. The TAP feels that the

designers have done essentially all that is humanly possible to make this a safe landfill that will be protective of ground water, surface water, and the underlying and surrounding environment. Given the favorable site conditions, sophisticated waste containment systems, and elaborate monitoring systems, the proposed Eagle Mountain Landfill could well become one of the world's safest landfills and a model for others to emulate."

Conclusions

In conclusion, modern MSW landfills, and the Eagle Mountain Landfill in particular, can be designed and constructed to effectively contain leachate and landfill gas, and thereby protect underlying ground-water quality. This point was recently made by Bonaparte [1995], who stated:

"... available data and information demonstrate that properly designed and constructed landfills can effectively contain, and allow collection of, leachate and gas. These goals are achieved through the use of liner systems, cover systems, and liquid and gas removal systems. Modern landfills can be designed to limit leachate and gas migration to insignificant levels. The potential for both hydraulic-gradient driven advection or chemical-gradient driven diffusion can be controlled. Where uncertainties exist, facility capabilities can be enhanced through overdesign and redundant design features."

"Conservative designs, developed within the framework of an appropriate long-term management strategy, can prevent both short- and long-term leachate and gas impacts to ground water. Achievement of these objectives is also dependent on the use of appropriate quality control and assurance of not only landfill construction, but also landfill operations, closure, and post-closure maintenance."

REFERENCES

August, H. and Tatzky, R. (1984) "Permeabilities of Commercially Available Polymeric Liners for Hazardous Waste Landfill Leachate Organic Constituents", *Proceedings of the International Conference on Geomembranes*, Vol. 1, Denver, pp. 163-168.

Barlaz, M.A. and Ham, R.K. (1993) "Leachate and Gas Generation", *Geotechnical Practice for Waste Disposal*, D.E. Daniel, ed., Chapman & Hall, London, pp. 113-136.

Barone, F.S., Yanful, E.K., Quigley, R.M., and Rowe, R.K. (1989) "Effect of Multiple Contaminant Migration on Diffusion and Adsorption of Some Domestic Waste Contaminants in a Natural Clayey Soil", *Canadian Geotechnical Journal*, Vol. 26, pp. 189-198.

Bass, J.M., Ehrenfeld, J.R., and Valentine, N.J. (1984) "*Potential Clogging of Landfill Drainage Systems*", USEPA, Municipal Environmental Research Laboratory, Cincinnati, OH, EPA-600/2-83-1090.

Berg, R.R. and Bonaparte, R. (1992) "Long-Term Allowable Tensile Stresses for Polyethylene Geomembranes", *Geotextiles and Geomembranes*, Vol. 12, No. 4, pp. 287-306.

Bonaparte, R., Giroud, J.P., and Gross, B.A. (1989) "Rates of Leakage Through Landfill Liners", *Proceedings of Geosynthetics '89 Conference*, Vol. 1, San Diego, pp. 18-29.

Bonaparte, R. and Gross, B.A. (1990) "Field Behavior of Double-Liner Systems", *Waste Containment Systems: Construction, Regulation, and Performance*, ASCE Geotechnical Special Publication No. 26, R. Bonaparte, ed., New York, pp. 52-83.

Bonaparte, R. and Gross, B.A. (1993) "LDCRS Flows from Double-Lined Landfills and Surface Impoundments", report to, under contract No. 68-CO-0068, EPA Risk Reduction Engineering Research Laboratory, Cincinnati, 65 p.

Bonaparte, R. (1995) "Long-Term Performance of Landfills", *Proceedings of the ASCE Specialty Conference Geoenvironment 2000*, ASCE Geotechnical Special Publication No. 46, Vol. 1, pp. 415-553.

Bonaparte, R. and Othman, M.A. (1995) "Characteristics of Modern MSW Landfill Performance", *Geotechnical News*, Vol. 13, No. 1, pp. 25-30.

Bonaparte, R. and Giroud, J.P. (1995) "Waste Containment Systems for Pollution Control: Part II-Hydraulic Design and Performance", Proceedings, NATO Advanced Study Institute, *Recent Advances in Ground-Water Pollution Control and Remediation*, Springer-Verlag, New York (in press).

Bonaparte, R., Othman, M.A., Rad, N.S., Swan, R.H., and Vander Linde, D.L. (1995) "Evaluation of Various Aspects of GCL Performance", *Proceedings, 3rd Workshop on Geosynthetic Clay Liners*, USEPA Risk Reduction Engineering Laboratory (in press).

Bowders, J.J. and Daniel, D.E. (1987) "Hydraulic Conductivity of Compacted Clay to Dilute Organic Chemicals", *Journal of Geotechnical Engineering*, Vol. 113, No. 12, pp. 1432-1448.

Bitton, L.N., Ashman, R.B., Aminabhavi, T.M., and Cassidy, P.E. (1989) "Permeation and Diffusion of Environmental Pollutants Through Flexible Polymers", *Journal of Applied Polymer Science*, Vol. 38, pp. 227-236.

Brown, K.W., Thomas, J.C., Lytton, R.L., Jayawickarama, P., and Bahrt, S.C. (1987) "Quantification of Leak Rates Through Holes in Landfill Liners", report for cooperative agreement CR-810940, EPA Risk Reduction Engineering Research Laboratory, Cincinnati, 147 p.

Carlson, D.S., Charron, R.M., Winfree, J.P., Giroud, J.P., and McLearn, M.E. (1993) "Laboratory Evaluation of HDPE Geomembrane Seams", *Proceedings, Geosynthetics '93 Conference*, Vol. 3, Vancouver, pp. 1543-1557.

Christopher, B.R. and Holtz, R.D. (1985) "*Geotextile Engineering Manual*," U.S. Federal Highway Administration, Report No. FHWA-TS-86/203, 1044 p.

Christopher, B.R. and Fischer, G.R. (1991) "Geotextile Filtration Principles, Practices and Problems," *Proceedings of 5th Geosynthetics Research Institute Seminar on Geosynthetics in Filtration, Drainage and Erosion Control*, Philadelphia, pp. 1-17.

Daniel, D.E. (1987) "Earthen Liners for Land Disposal Facilities", *Geotechnical Practice for Waste Disposal '87*, ASCE Geotechnical Special Publication No. 13, R.D. Woods, ed., New York, pp. 21-39.

Daniel, D.E., Anderson, D.C., and Boynton, S.S. (1985) "Fixed Wall Versus Flexible Wall Permeameters", *Hydraulic Barriers in Soil and Rock*, ASTM STP 874, A.I. Johnson et al., eds., pp. 107-126.

Daniel, D.E. and Liljestrand, H.M. (1984) "Effects of Landfill Leachates on Natural Liner Systems", Department of Civil Engineering, University of Texas, Austin, 86 p.

Daniel, D.E. (1993) "*Geotechnical Practice for Waste Disposal*", Chapman & Hall, London, 683 p.

Day, S.R. and Daniel, D.E. (1985) "Hydraulic Conductivity of Two Prototype Clay Liners", *Journal of Geotechnical Engineering*, Vol. 111, No. 8, pp. 957-970.

EPA (1987) Proposed Rulemaking, 40 CFR Parts 260, 264, 265, 270, and 271, "Liners and Leak Detection for Hazardous Waste Land Disposal Units, Federal Register, Vol. 52, No. 103, pp. 20218-20311.

EPA (1988) "Draft Background Document - Summary of Data on Municipal Waste Landfill Leachate Characteristics", EPA/530-SW-88-038.

EPA (1991) "Seminar Publication: Design and Construction of RCRA/CERCLA Final Covers", EPA/625/4-91/025, 145 p.

Faure, Y.H. (1984) "Design of Drain Beneath Geomembranes: Discharge Estimation and Flow Patterns in Case of Leak", *Proceedings of the Third International Conference on Geotextiles*, Vol. 3, pp. 917-922.

Feeney, M.T. and Maxson, A.E. (1993) "Field Performance of Double-Liner Systems", *Proceedings, Geosynthetics '93 Conference*, Vol. 3, Vancouver, pp. 1373-1387.

Fernandez, F. and Quigley, R.M. (1991) "Controlling the Destructive Effects of Clay-Organic Liquid Interactions by Application of Effective Stresses", *Canadian Geotechnical Journal*, Vol. 28, pp. 388-398.

Frobel, R., Youngblood, W., and Vandervoort, J. (1987) "The Composite Advantage in the Mechanical Protection of Polyethylene Geomembranes - A Laboratory Study", *Proceedings, Geosynthetics '87 Conference*, Vol. 2, New Orleans, pp. 565-576.

Fukuoka, M. (1986) "Large Scale Permeability Tests for Geomembrane-Subgrade System", *Proceedings of the Third International Conference on Geotextiles*, Vol. 3, pp. 917-922.

Giroud, J.P. (1982) "Filter Criteria for Geotextiles", *Proceedings of the Second International Conference on Geotextiles*, Vol. 1, pp. 103-108.

Giroud, J.P. (1984a) "Analysis of Stresses and Elongations in Geomembranes", *Proceedings, International Conference on Geomembranes*, Vol. 2, Denver, pp. 481-486.

Giroud, J.P. (1988) "Review of Geotextile Filter Criteria", *Proceedings of the First Indian Geotextiles Conference*, pp. 1-6.

Giroud, J.P. and Bonaparte, R. (1989) "Leakage Through Liners Constructed with Geomembranes, Part II: Composite Liners", *Geotextiles and Geomembranes*, Vol. 8, No. 2, pp. 77-111.

Giroud, J.P., Badu-Tweneboah, K., and Bonaparte, R. (1992) "Rate of Leakage Through a Composite Liner due to Geomembrane Defects", *Geotextiles and Geomembranes*, Vol. 11, No. 1, pp. 1-28.

Giroud, J.P., Soderman, K.L., and Monroe, M. (1993) "Mechanical Design of Geomembrane Applications", *Proceedings, Geosynthetics '93 Conference*, Vol. 3, Vancouver, pp. 1455-1468.

Halse, Y.H., Koerner, R.M., and Lord, A.E., Jr. (1988) "Laboratory Evaluation of Stress Cracking in HDPE Seams", *Aging and Durability of Geosynthetics*, R.M. Koerner, ed., Elsevier, London, pp. 177-194.

Halse, Y.H., Koerner, R.M., and Lord, A.E., Jr. (1990) "Ductile-to-Brittle Transition Time in Polyethylene Geomembrane Sheet", *Geosynthetic Testing for Waste Containment Applications*, ASTM STP 1081, R.M. Koerner, ed., pp. 95-109.

Ham, R.K. (1990) "The Potential for Gas Generation and Leachate Production at the Proposed Eagle Mountain Landfill", Report prepared for Mine Reclamation Corporation.

Haxo, H.E., Miedema, J.A. and Nelson, N.A. (1984) "Permeability of Polymeric Membrane Lining Materials", *Proceedings of the International Conference on Geomembranes*, Vol. 1, Denver, pp. 151-156.

Haxo, H.E., Jr. and Haxo, P.D. (1988) "*Consensus Report of the Ad Hoc Meeting on the Service Life in Landfill Environments of Flexible Membrane Liners and Other Synthetic Polymer Materials of Construction*", Prepared for the USEPA Hazardous Waste Engineering Research Laboratory, Cincinnati, 55 p.

Haxo, H.E. and Lahey, T.P. (1988) "Transport of Dissolved Organics from Dilute Aqueous Solutions through Flexible Membrane Liners", *Hazardous Waste & Hazardous Materials*, Vol. 5, No. 4, pp. 275-294.

Heerten, G. (1993) "Geotextile and/or GCL Protection Systems for Geomembranes", *Proceedings, 7th Geosynthetic Research Institute Conference*, Drexel University, pp. 155-167.

Hermann, J.G. and Elsbury, B.R. (1987) "Influential Factors in Soil Liner Construction for Waste Disposal Facilities", *Geotechnical Practice for Waste Disposal '87*, ASCE Geotechnical Special Publication No. 13, R.D. Woods, ed., pp. 522-536.

Hessel, J. and John, P. (1987) "Long-Term Strength of Welded Joints in Polyethylene Water Proofing Sheets for Refuse Dumps", *Materialwissenschaft Und Werkstofftech*, Vol. 18, pp. 228-231. Translated by SCITRAN.

Jayawickrama, P., Brown, K.W., Thomas, J.C., and Lytton, R.L. (1988) "Leakage Rates Through Flaws in Geomembrane Liners", *Journal of Environmental Engineering*, Vol. 114, No. 6, pp. 1401-1420.

Johnson, R.L., Cherry, J.A., and Pankow, J.F. (1989) "Diffusive Contaminant Transport in Natural Clay: A Field Example and Implications for Clay-Lined Waste Disposal Sites", *Environmental Science and Technology*, Vol. 23, No. 3, pp. 340-349.

Keenan, J.D. (1986) "Landfill Leachate Management", *Journal of Resource Management and Technology*, Vol. 14, No. 3, pp. 177-180.

King, K.S., Quigley, R.M., Fernandez, F., Reades, D.W., and Bacopoulous, A. (1993) "Hydraulic Conductivity and Diffusion Monitoring of the Keele Valley Landfill Liners, Maple, Ontario", *Canadian Geotechnical Journal*, Vol. 30, pp. 124-134.

Koch, P., Gaube, E., Hessel, J., Gondro, C., and Heil, H. (1988) "Long-Term Strength of Dump Lining Sheets Made of Polyethylene", *Muelll and Abfall*, Vol. 8, pp. 3-12. Translated by SCITRAN.

Koerner, G.R. and Koerner, R.M. (1989) "Biological Clogging of Leachate Collection Systems", *Durability and Aging of Geosynthetics*, R.M. Koerner, Ed., Elsevier, pp. 260-277.

Koerner, R.M. (1990) "*Designing with Geosynthetics*", Prentice Hall, Englewood Cliffs, NJ, 625 p.

Koerner, G.R. and Koerner, R.M. (1990a) "Biological Activity and Potential Remediation Involving Geotextile Landfill Leachate Filter", *Geosynthetic Testing for Waste Containment Applications*, ASTM STP 1081, R.M. Koerner, Ed., pp. 313-334.

Koerner, R.M. and Koerner, R.G. (1990b) "*Landfill Leachate Clogging of Geotextile and Sand Filters*", USEPA, CR-814965, Final Draft, 149 p.

Koerner, G.R. and Koerner, R.M. (1991) "Leachate Flow Rate Behavior through Geotextile and Soil Filters and Possible Remediation Methods", *Proceedings of the 5th GRI Seminar on Geosynthetics in Filtration, Drainage and Erosion Control*, pp. 63-89.

Koerner, R.M., Lord, A.E., and Hsuan, Y.H. (1992) "Arrhenius Modelling to Predict Geosynthetic Degradation", *Geotextiles and Geomembranes*, Vol. 11, No. 2, pp. 151-184.

Landreth, R.E. (1990) "Chemical Resistance Evaluation of Geosynthetics Used in Waste Management Applications", *Geosynthetics Testing for Waste Management Applications*, ASTM STP 1081, R.M. Koerner, ed., pp. 3-11.

Luettich, S.M., Giroud, J.P., and Bachus, R.C. (1991) "Geotextile Filter Design Guide", *Proceedings of 5th Geosynthetics Research Institute Seminar on Geosynthetics in Filtration, Drainage and Erosion Control*, Philadelphia, pp. 18-33.

Mitchell, J.K. and Madsen, F.T. (1987) "Chemical Effects on Clay Hydraulic Conductivity", *Geotechnical Practice for Waste Disposal '87*, ASCE Geotechnical Specialty Publication No. 13, R.D. Woods, ed., pp. 87-116.

Mores, M., Cassidy, P.E., Kerwick, D.J., and Koeck, D.C. (1990) "A Review of Polymer Test Methods Applicable to Geosynthetics for Waste Containment", *Geosynthetics Testing for Waste Containment Applications*, ASTM STP 1081, R.M. Koerner, ed., pp. 12-24.

Olson, R.E. and Daniel, D.E. (1981) "Measurement of the Hydraulic Conductivity of Fine Grained Soils", *Permeability and Ground Water Contaminant Transport*, ASTM STP 746, T.F. Zimmie and C.O. Riggs, eds., pp. 18-64.

Othman, M.A., Bonaparte, R., Gross, B.A., and Schmertmann, G.R. (1995) "Design of MSW Landfill Final Cover Systems", *Proceedings of the Symposium on Landfill Closures-Environmental Protection and Land Recovery*, ASCE Geotechnical Special Publication No. 46, pp. 218-257.

Peggs, I.D. and Carlson, D.S. (1989) "Brittle Fracture in Polyethylene Geomembranes", *Geosynthetics: Microstructure and Performance*, ASTM STP 1076, I.D. Peggs, ed., pp. 57-77.

Peggs, I.D. and Carlson, D.S. (1990) "The Effects of Seaming on the Durability of Adjacent Polyethylene Geomembranes", *Geosynthetic Testing for Waste Containment Applications*, ASTM STP 1081, R.M. Koerner, ed., pp. 132-142.

Pierce, J.J., Sallfurs, G., Peel, T.A., and Witter, K.A. (1987) "Effects of Selected Inorganics on Clay Permeability", *Journal of Geotechnical Engineering*, Vol. 113, No. 8, pp. 915-919.

Quigley, R.M., Fernandez, F., and Rowe, R.K. (1988) "Clayey Barrier Assessment for Impoundment of Domestic Waste Leachate (Southern Ontario) Including Clay-Leachate Compatibility by Hydraulic Conductivity Testing", *Canadian Geotechnical Journal*, Vol. 25, No. 8, pp. 574-581.

Ramsey, D.R. (1993) "Diffusivities of Organic Contaminants in High Density Polyethylene", *Proceedings, Geosynthetics '93 Conference*, Vol. 2, Vancouver, pp. 645-658.

Rohde, J.R. and Gribb, M.S. (1990) "Biological and Particulate Clogging of Geotextile/Soil Filter Systems", *Geosynthetic Testing for Waste Containment Applications*, ASTM STP 1081, R.M. Koerner, Ed., pp. 299-312.

Rowe, R.K., Caers, C.J., and Barone, F. (1988) "Laboratory Determination of Diffusion and Distribution Coefficients of Contaminants Using Undisturbed Clayey Soil", *Canadian Geotechnical Journal*, Vol. 25, pp. 108-118.

Sai, J.O. and Anderson, D.C. (1990) "Field Hydraulic Conductivity Test for Compacted Soil Liners", *ASTM Geotechnical Testing Journal*, Vol. 13, No. 3, pp. 215-225.

Shackelford, C.D. and Daniel, D.E. (1991a) "Diffusion in Saturated Soil. I: Background", *Journal of Geotechnical Engineering*, Vol. 117, No. 3, pp. 467-484.

Shackelford, C.D. and Daniel, D.E. (1991b) "Diffusion in Saturated Soil. II: Results for Compacted Clay", *Journal of Geotechnical Engineering*, Vol. 117, No. 3, pp. 485-506.

Sherard, J.L. (1985) "The Upstream Zone in Concrete-Fence Rockfill Dams", *Proceedings of a Symposium on Concrete Faces Rockfill Dams - Design, Construction, and Performance*, sponsored by the Geotechnical Engineering Division of the American Society of Civil Engineers, J. Barry Cooke and James L. Sherard, Eds., pp. 618-641.

Tchobanoglous, G., Theisen, H., and Vigil, S. (1993) "*Integrated Solid Waste Management*", McGraw-Hill, Inc., New York, 978 p.

Trautwein, S.J. and Williams, C.E. (1990) "Performance Evaluation of Earthen Liners", *Waste Containment Systems: Construction, Regulation, and Performance*, ASCE Geotechnical Special Publication No. 26, R. Bonaparte, ed., pp. 30-51.

Wilson-Fahmy, R.F., Narejo, D.B., and Koerner, R.M. (1994) "A Design Methodology for the Puncture Protection of Geomembranes", *Geosynthetics Research Institute Report #13*, Drexel University, Philadelphia, 93 p.

Workman, J.P. (1993) "Interpretation of Leakage Rates in Double-Lined Systems", *Proceedings, 7th Geosynthetic Research Institute Seminar*, Drexel University, Philadelphia, pp. 91-108.

Appendix C-4
Ground-Water Investigation and Monitoring Summary Report

Prepared for

Mine Reclamation Corporation
960 Tahquitz Canyon Way, Suite 204
Palm Springs, California 92262

GROUND-WATER INVESTIGATION AND MONITORING SUMMARY REPORT

EAGLE MOUNTAIN LANDFILL AND RECYCLING CENTER RIVERSIDE COUNTY, CALIFORNIA

Prepared by



GeoSyntec Consultants
2100 Main Street, Suite 150
Huntington Beach, California 92648

Project Number GE3586-18

May 1996

EXECUTIVE SUMMARY

At the request of Mine Reclamation Corporation (MRC), GeoSyntec Consultants (GeoSyntec) has summarized the results of hydrogeologic investigations performed for the Eagle Mountain Landfill project located in northeastern Riverside County, California. The investigations were performed from 1989 through 1993 by several firms, including SCS Engineers, GSi/water, Ground-Water Associates, Inc., and GeoSyntec. The results of the investigations are reported in detail in the Report of Waste Discharge (ROWD) and its supplemental volumes ROWD-SV1 and ROWD-SV2 [GeoSyntec, 1992, 1993a,b]. The ROWD specifically addresses development of Phases 1, 2, 3, and 4 of the proposed landfill. The ROWD was submitted to the California Regional Water Quality Control Board - Colorado River Basin, Region 7 (RWQCB) in December 1992, whereas the two ROWD supplements were submitted in June 1993, and December 1993, respectively. The RWQCB issued Waste Discharge Requirements (WDRs) for Phases 1 through 4 of the Eagle Mountain Landfill on 17 May 1994. An ROWD for development of Phase 5 of the landfill is planned for a future date. It is noted, however, much of the hydrogeologic information developed during the 1989 to 1993 investigations is applicable to Phase 5 of the Eagle Mountain Landfill project.

The report that follows addresses the occurrence and movement of ground water in regard to both the regional and the local flow regimes. Particular emphasis is placed on investigation of the fracture system of the bedrock beneath the site with respect to storage and movement of ground water in the bedrock and the relevance of the concept of equivalent porous-media flow. Section 2 of the report presents a summary of the site-specific geologic and hydrogeologic investigations performed for the project from 1989 through 1993. The results of the investigations are reported in the ROWD. The regional and site-specific geology and hydrogeology of the Eagle Mountain site and vicinity are described respectively, in Sections 3 and 4. The principal findings of the hydrogeologic investigations are highlighted in Section 5. The discussion in Section 5 emphasizes the concept of equivalent porous-media flow and presents results of

evaluations that indicate that ground-water flow in the fractured bedrock beneath the site may be conceptualized as a nonhomogeneous equivalent porous-media.

The proposed ground-water monitoring plan for the Eagle Mountain Landfill is briefly described in Section 6 of the report. The RWQCB-approved plan for the first four phases of landfill development consists of nine upgradient ground-water monitoring wells and 27 downgradient wells. A proposed ground-water monitoring plan for Phase 5 of landfill development is also presented in this report. The rationale for placement of the wells with respect to the point-of-compliance and the significant hydrogeologic features of the site is given. The overall suitability and reliability of the proposed monitoring-well network is discussed with respect to regulatory requirements of Chapter 15, Title 23, of the California Code of Regulations and federal requirements contained in Title 40, Section 258, of the Code of Federal Regulations. A summary and conclusions of the hydrogeologic investigations are presented in Section 7 of the report.

Based on the detailed hydrogeologic information developed in the site investigation, the nature of ground-water movement within the fractured bedrock beneath the Eagle Mountain Landfill site is well understood. The data show that the densely-distributed intersecting fracture system in the bedrock meets criteria for porous-media equivalency. As a consequence of this finding, generally accepted principles of ground-water flow in porous media may be applied to interpretation of the site hydrogeologic data. This finding is also important to establishing the monitorability of the quality of the ground water moving from beneath the landfill. Therefore, a basic conclusion of the hydrogeologic investigations of the Eagle Mountain Landfill site is that ground water beneath the site can be effectively and reliably monitored.

TABLE OF CONTENTS

EXECUTIVE SUMMARY i

1. INTRODUCTION 1

1.1 Terms of Reference 1
1.2 Purpose and Scope of this Report 2
1.3 Organization of this Report 2

2. SITE-SPECIFIC GEOLOGIC AND HYDROGEOLOGIC STUDIES 4

2.1 Studies Conducted for Original ROWD 4
2.2 Studies Conducted for ROWD-SV1 5
2.3 Studies Conducted for ROWD-SV2 6
2.4 Waste Discharge Requirements 6

3. ENVIRONMENTAL SETTING 7

3.1 Location 7
3.2 Climate 7
3.3 Topography and Surface Drainage 8
3.4 Regional Geology and Hydrogeology 9

3.4.1 Geology 9
3.4.2 Hydrogeology 11

4. SITE GEOLOGY 14

4.1 Stratigraphy 14

4.1.1 Bedrock 14
4.1.2 Surficial Deposits 15

TABLE OF CONTENTS (continued)

4.1.2.1 Alluvium 15
4.1.2.2 Mining By-Product Piles 16

4.2 Structure 16

4.2.1 Bedrock 16
4.2.2 Surficial Deposits 18

5. SITE GROUND-WATER FLOW SYSTEM 19

5.1 Overview 19
5.2 Ground-Water Recharge Characteristics 19
5.3 Equivalency of Flow in Fractured Bedrock to Flow in Porous Media 20

5.3.1 Overview 20
5.3.2 Configuration of Potentiometric Surface 22
5.3.3 Fracture Patterns 26
5.3.4 Distribution of Hydraulic Conductivity 29
5.3.5 Response to Pumping Tests 33
5.3.6 Ground-Water Chemistry 35
5.3.7 Summary Comparison with Porous-Media Equivalency Criteria 38

5.4 Ground-Water Migration and Discharge 38
5.5 Implications for Ground-Water Monitoring 40

TABLE OF CONTENTS (continued)

6. GROUND-WATER MONITORING PROGRAM 42

6.1 Overview 42
6.2 Regulatory Requirements 43
6.3 Uppermost Ground-Water Flow System 44
6.4 Ground-water Flow Direction 44
6.5 Point-of-Compliance 45
6.6 Suitability and Reliability of Monitoring-Well Network 46
6.7 Compliance of Monitoring-Well Network with Regulations 49

7. SUMMARY AND CONCLUSIONS 51

REFERENCES 56

APPENDIX A: WORK PLAN FOR GROUND-WATER SAMPLING, PROPOSED EAGLE MOUNTAIN LANDFILL

TABLES
FIGURES

LIST OF TABLES

Table 1. Static Water Level Elevation, Eagle Mountain Landfill.

Table 2. Borehole Data Summary Sheet, Eagle Mountain Landfill.

Table 3. Average Fracture Aperture Width and Calculated Hydraulic Conductivity from Detailed Fracture Analyses, Eagle Mountain Landfill.

Table 4. Summary of Statistics of Ground-Water Quality, June 1989 through June 1993 Quarterly Sampling, Eagle Mountain Landfill.

Table 5. Results of Ground-Water Quality Sampling in Piezometer P-20 during Constant-Discharge Pumping Test, Eagle Mountain Landfill.

Table 6. Comparison of USEPA Porous Media Equivalency Criteria with Properties of Eagle Mountain Bedrock Aquifer, Eagle Mountain Landfill.

LIST OF FIGURES

Figure 1. Site Vicinity Map

Figure 2. Physiographic Setting and Regional Direction of Ground-Water Flow

Figure 3. Existing Topography

Figure 4. Faults and Dikes

Figure 5. Potentiometric Surface of Saturated Bedrock and Lines of Hydrogeologic Cross Sections

Figure 6a. Hydrogeologic Cross Section X-X
Figure 6b. Hydrogeologic Cross Sections Y-Y and Z-Z

Figure 7a. Average Aperture Widths with Depth: MW-7
Figure 7b. Average Aperture Widths with Depth: MW-8

Figure 8. Rose Diagrams: Primary, Secondary, and Tertiary Fractures

Figure 9. Statistical Distribution of Hydraulic Conductivities Calculated from Fracture Apertures

Figure 10. Statistical Distribution of Hydraulic Conductivities Calculated from Packer Tests

Figure 11. Characteristic Pumping Test Responses

Figure 12. Representative Ground-Water Pathway Cross Section

Figure 13. Point-of-Compliance Ground-Water Monitoring Program

Figure 14. Water Quality Monitoring Plan, Phases 1 through 4

Figure 15. Water Quality Monitoring Plan, Phase 5

1. INTRODUCTION

1.1 Terms of Reference

At the request of Mine Reclamation Corporation (MRC), Palm Desert, California, GeoSyntec Consultants (GeoSyntec) has reviewed and summarized the results and conclusions of extensive hydrogeologic characterization investigations performed from 1989 through 1993 at the site and vicinity of the proposed Eagle Mountain Landfill and Recycling Center (Eagle Mountain Landfill) in northeastern Riverside County, California. The original hydrogeologic investigations and interpretations were performed by several firms, including SCS Engineers, GSi/water, Ground-Water Associates, Inc., and GeoSyntec. The purpose of the investigations was to develop information necessary for preparation of the Report of Waste Discharge (ROWD) [GeoSyntec, 1992] and its supplemental volumes ROWD-SV1 [GeoSyntec, 1993a] and ROWD-SV2 [GeoSyntec, 1993b]. These three documents address design and development of the first four phases of landfill development. The ROWD, ROWD-SV1, and ROWD-SV2 were prepared for submission to the California Regional Water Quality Control Board - Colorado River Basin, Region 7 (RWQCB) in December 1992, June 1993, and December 1993, respectively. The RWQCB approved Waste Discharge Requirements (WDRs) for Phases 1 through 4 of the Eagle Mountain Landfill on 17 May 1994. An ROWD for development of Phase 5 of the landfill is planned for a future date. It is noted, however, much of the hydrogeologic information developed during the 1989 to 1993 investigations is applicable to Phase 5 of the Eagle Mountain Landfill project.

The ROWD and its supplemental volumes present information describing the siting, design, construction, operation, closure and post-closure maintenance of the proposed landfill (i.e., the plan for landfill development). The information in the ROWD is intended to demonstrate compliance of the plan for landfill development with all applicable requirements of Articles 2, 3, 4, 5, 8, and 9 of Title 23, California Code of Regulations, Chapter 15 (hereafter referred to as Chapter 15), as well as federal regulations contained in Part *257, "Criteria for Classification of Solid Waste Disposal*

Facilities and Practices" and "Criteria for Municipal Solid Waste Landfills," of Title 40 of the Code of Federal Regulations (hereafter referred to as 40 CFR §258).

1.2 Purpose and Scope of this Report

The purpose of this report is to summarize the results of the hydrogeologic investigations for the proposed Eagle Mountain Landfill site and surrounding vicinity performed from 1989 through 1993 and reported in the ROWD, ROWD-SV1, and ROWD-SV2 [GeoSyntec, 1992, 1993a,b]. The report addresses the occurrence and movement of ground water in regard to both the regional and the local flow regimes.

Particular emphasis is placed on investigation of the bedrock fracture system beneath the site with respect to storage and movement of ground-water in the bedrock and the relevance of the concept of equivalent porous-media flow. Further emphasized is the importance of this concept as applied in establishing the monitorability of the site in compliance with Chapter 15 and 40 CFR §258 requirements.

1.3 Organization of this Report

The remainder of this report is organized as follows:

- *Section 2* - In this section of the report, the site-specific geologic and hydrogeologic investigations conducted for the Eagle Mountain Landfill project are summarized. The information obtained from these investigations was used to prepare the ROWD and the ROWD supplemental volumes.

- *Section 3* - This section of the report presents brief descriptions of the proposed landfill area location, climate, topography, and regional geology and hydrogeology.

- *Section 4* - In this section, a summary description of the site geology, including the stratigraphy and structure of both bedrock and surficial deposits, is presented.

- *Section 5* - The site hydrogeologic model, developed through the site-specific investigations performed for the Eagle Mountain Landfill project, is discussed in this section of the report. The characteristics of ground-water recharge, movement, and discharge are defined. An evaluation of the applicability of the concept of equivalent porous-media flow to the fractured bedrock ground-water flow system beneath the site is provided and the implications of this evaluation with respect to ground-water monitoring at the Eagle Mountain Landfill site are discussed.

- *Section 6* - The ground-water monitoring plan presented in the ROWD is summarized in this section, as are modifications and additions to the plan that will be needed to meet monitoring requirements when Phase 5 becomes operational. As part of the review, this section addresses the unsaturated zone monitoring layer beneath the landfill liner system, the network of upgradient and downgradient monitoring wells, the point-of-compliance, and the overall suitability and reliability of the proposed monitoring-well network with respect to regulatory requirements of Chapter 15 and 40 CFR §258.

- *Section 7* - Lastly, this section presents a summary of investigative findings, particularly as they relate to monitorability of ground water moving from beneath the proposed landfill site, and conclusions relevant to compliance of the proposed monitoring program with state and federal regulations.

2. SITE-SPECIFIC GEOLOGIC AND HYDROGEOLOGIC STUDIES

2.1 Studies Conducted for Original ROWD

To meet the requirements of §2595 of Chapter 15, Section 5 of the ROWD [GeoSyntec, 1992] contained information on the environmental setting of the proposed Eagle Mountain Landfill. The information covered site location, topography, climate, land use, geology, faulting and seismicity, ground-water hydrology, and surface-water hydrology. Section 5 of the ROWD included 9 tables, 27 figures, 7 plates, and 3 appendices. The information was used to specifically address the first four phases of landfill development, although much of the information is also applicable to Phase 5. The information presented was based on comprehensive literature search followed by a first episode of project-specific subsurface investigation performed by SCS Engineers [1990] followed by more extensive surface and subsurface hydrogeologic field investigations completed in the late fall of 1992, primarily by GSi/water [1990, 1991a,b,c,d,e,f; 1992a,b,c; and 1993a,b,c,d], and submitted to the RWQCB as part of the ROWD in December 1992.

During 1991 and 1992, geologic, gravity, and thermal surveys were conducted by GSi/water at and near the proposed Eagle Mountain Landfill site. The purpose of the surveys was to aid in evaluating the configuration and characteristics of the bedrock ground-water flow system beneath the site, as well as the ground-water flow system in nearby portions of the alluvial Chuckwalla Valley.

An array of subsurface hydrogeologic investigative methods were applied in the process of characterizing the ground-water hydrogeology of the proposed Eagle Mountain Landfill site. Basic to these subsurface investigations was the utilization of existing boreholes and wells in the area as well as the drilling of a variety of new test borings and coreholes and the construction of new observation/monitoring wells and piezometers. Methods applied to acquire needed hydrogeologic data from boreholes, coreholes, wells, and piezometers included: (i) borehole geological logs; (ii) borehole geophysical logs; (iii) borehole video logs; (iv) corehole packer pressure tests; (iv)

multiple-well pumping tests; (v) ground-water level measurements; (vi) ground-water quality sampling and analysis; and (vii) borehole temperature surveys. More than 60 existing and new borings were utilized in the hydrogeologic investigations performed to prepare the ROWD. The investigations for the ROWD also include obtaining and analyzing more than 7,500 ft (2,300 m) of rock core, performing packer pressure tests in five coreholes, and performing two sets of multiple-well pumping tests.

The information in Section 5 of the ROWD was used as a primary factor in designing the water-quality monitoring programs for the proposed landfill. The proposed water-quality monitoring programs, including programs for (i) ground water, (ii) surface water, and (iii) liquid in the unsaturated (vadose) zone, are described in detail in Section 11 of the ROWD. Accurate information on the occurrence and movement of ground water is a necessary prerequisite to the development of an effective ground-water monitoring program. The results of the hydrogeologic investigations reported in the ROWD, coupled with additional information later reported in supplementary volumes ROWD-SV1 and ROWD-SV2, provide the necessary information.

2.2 Studies Conducted for ROWD-SV1

Supplemental geologic and hydrogeologic investigative effort was performed in early 1993 by GSi/water, Mr. Richard J. Proctor, and Dr. Roy J. Shlemon, partly in response to questions and comments by regulatory agency personnel arising from review of the ROWD. The information developed from the supplemental investigations was presented in ROWD-SV1, which was submitted to the RWQCB in June 1993 [GeoSyntec, 1993a]. Most importantly, from a hydrogeologic point-of-view, three additional piezometers were installed in the bedrock aquifer at the site [GSi/water, 1993a] to obtain ground-water level measurements to refine the potentiometric-surface map and to confirm the suitability of downgradient ground-water monitoring-well locations previously selected and described in Section 11 of the ROWD.

2.3 Studies Conducted for ROWD-SV2

Later in 1993, additional supplemental hydrogeologic investigations were performed by GSi/water [1993a,b,c,d], Ground-Water Associates, Inc. [1993], and GeoSyntec. The results of these investigations were presented in ROWD-SV2, which was submitted to the RWQCB in December 1993 [GeoSyntec, 1993b]. This work involved intensive supplemental investigation of bedrock fracture patterns and apertures utilizing data from 20 boreholes including cores from a number of core borings distributed across the site and borehole videologs. A new ground-water pumping well and four new piezometers were installed to perform additional multiple-well pumping tests, the results of which were evaluated by Ground Water Associates, Inc. [1993]. Statistical analyses of the distribution of hydraulic conductivity across the site were performed and ground-water level records from 31 core borings, monitoring wells, and piezometers were used to refine and update the potentiometric-surface maps for the site. This supplemental hydrogeologic characterization program resulted in: (i) an updated hydrogeologic model for the project site; (ii) an assessment of the degree to which the ground-water flow system beneath the site satisfies the necessary conditions for porous-media flow equivalency; and (iii) conclusions on the suitability of the ground-water point-of-compliance and monitoring-well network proposed in the ROWD.

2.4 Waste Discharge Requirements

As previously noted, the RWQCB issued WDRs for Phases 1 through 4 of the Eagle Mountain Landfill on 17 May 1994. The WDRs specify requirements for landfill water-quality monitoring systems consistent with the ROWD, ROWD-SV1, and ROWD-SV2. The WDRs also contained several additional requirements with respect to monitoring parameters and reporting.

3. ENVIRONMENTAL SETTING

3.1 Location

The proposed Eagle Mountain Landfill site is located in a remote area of northeastern Riverside County in southern California, approximately 170 mi (322 km) east of Los Angeles, 60 mi (100 km) east of Palm Springs, and 50 mi (81 km) west of the Arizona border. The site's location within Riverside County is shown on Figure 1. As can be seen on Figure 1, the site lies approximately 8 and 10 mi (13 and 16 km) north, respectively, of the communities of Lake Tamarisk and Desert Center. The project site occupies a plan area of about 4,684 acres (1,896 hectares), mostly within a portion of the inactive Eagle Mountain iron ore mine property. The landfill portion of Phases 1 through 4 will occupy a plan area of approximately 1,868 acres (756 hectares). Phase 5 will increase the footprint by approximately 286 acres (116 hectares).

As shown on the map of the physiographic setting for the site in Figure 2, the proposed landfill site is situated near the northeastern end of the Eagle Mountains. The site is bordered on the north by the Eagle Mountains, on the east and southeast by the Chuckwalla Valley, and on the southwest and west by the Eagle Mountains.

3.2 Climate

The Eagle Mountain Landfill site is located in an arid area of northeastern Riverside County. As described in Subsection 5.2.3 of the ROWD (GeoSyntec, 1992), the climate at the site is typical for a desert environment. Annual precipitation in the vicinity of the site averaged approximately 3.5 in. (90 mm) from 1933 to 1990. The mean annual pan evaporation rate at the site is 156 in. (3,960 mm). The estimated average annual temperature in the site vicinity is about 74° F (23° C). However, daytime temperatures in July and August are typically over 100° F (38° C), and the highest recorded in the 1951-1980 period was 118° F (48° C). Average daily

temperatures in January, the coldest month, were 64.1° F (17.8° C) for the daily maximum and 44.1° F (6.7° C) for the daily minimum in the 1951-1980 period. The lowest temperature recorded in the 30-year period 1951-1980 was 25° F (-4° C). The climate at the site is extremely dry. The climatic conditions will tend to minimize rain-water infiltration into the landfill. The prevailing wind direction for the Eagle Mountain Landfill site is from the west and northwest, but in late summer, winds often blow from the southeast.

3.3 Topography and Surface Drainage

The proposed Eagle Mountain Landfill property extends about 4.5 mi (7.2 km) in length (east-west) and about 1.5 mi (2.4 km) in width (north-south). The site is situated within the northeastern edge of the Eagle Mountains in an area of high topographic relief. The map of existing topography in Figure 3 shows that within the property boundaries of the site, natural ground-surface elevations range between about 1,000 and 2,900 ft above sea level, based on the national geodetic vertical datum of 1929 (NGVD-1929). The terrain is rugged, consisting of a series of semi-parallel southeastward sloping canyons that drain to Eagle Creek, the course of which, in turn, drains east and southeast out of the Eagle Mountains to the Chuckwalla Valley immediately east of the site. Ground-surface elevation at the northwestern edge of the Chuckwalla Valley (i.e., immediately east of the site) is about 1,100 ft (335 m) above sea level. The relatively smooth valley floor slopes downward to the east-southeast away from the site toward the valley axis at the rate of about 100 ft per mile (20 m per km).

Surface drainage from the proposed landfill site is eastward to southeastward via Eagle Creek, an ephemeral stream that flows only during and shortly after precipitation events. The natural course of Eagle Creek leads to the Chuckwalla Valley along a line outside of, but roughly parallel to, the southern boundary of the proposed landfill footprint. However, as a result of mine development and to protect the town of Eagle Mountain from flash flooding, the flow of Eagle Creek was many years ago diverted to the south haul road, which bounds the south edge of the proposed landfill footprint,

and thence to the west bowl of the East Pit for detention (see Figure 3). As a part of the landfill surface-water management system, the flow of Eagle Creek will continue to be diverted to the East Pit for the first four phases of landfill development. However, when landfill Phase 5 is developed, the intermittent flow of Eagle Creek will be diverted to a surface retention area southeast of the East Pit. A named tributary to Eagle Creek is Bald Eagle Creek, another ephemeral stream that flows southeastward across the central part of the site. However, any flow in Bald Eagle Creek has been cut off from discharge to the natural course of Eagle Creek by the excavation of the East Pit during former mining operations at the site. Any flow down Bald Eagle Creek is now detained in the west bowl of the East Pit. When the landfill is developed, the intermittent flow of Bald Eagle Creek will be diverted to a surface retention area near the northeast corner of the landfill property.

3.4 Regional Geology and Hydrogeology

3.4.1 Geology

The Eagle Mountains extend into the Basin and Range Geologic Province as the eastern extremity of the Southern California Transverse Ranges. The mountains comprise Jurassic to Cretaceous age plutonic intrusive rocks emplaced in Paleozoic and Precambrian-age metasedimentary rocks. Iron minerals are found between quartzite units of the metasedimentary rocks as magnetite and hematite. The iron minerals were formed by the replacement of carbonate metasedimentary rocks that had been previously subjected to hydrothermal alteration. Metasedimentary rocks in the Eagle Mountains form a northwest-trending roof pendant within the intrusive rocks. The roof pendant is approximately in line with similar age formations in other mountain ranges northwest and southeast of the Eagle Mountains. The roof pendant has been folded into a northwest trending anticline which extends across the north central Eagle Mountains. Major ore bodies are located along the north limb of this anticline.

Bedrock jointing is prominent and extensively interconnected. Intersecting joint systems are well developed. At the proposed landfill site, the predominant joint system dips steeply to near vertical and trends southeasterly and nearly parallel with ancient bedrock faults present in the area.

Non-Holocene-age faults have been observed within the property boundaries of the inactive Eagle Mountain Iron Mine site, as shown on Figure 4. These faults trend southeasterly. Local faulting at the proposed landfill site has been extensively investigated by Proctor [1993], Shlemon [1993], and GSi/water [in GeoSyntec, 1993a] and found not to be active. A summary of these investigations has been presented by GeoSyntec [1993c].

Northeast-trending dikes occur within the granitic plutonic rocks north and south of Eagle Creek in the vicinity of the proposed landfill footprint. As shown in Figure 4, the dikes are sub-parallel, occurring at approximately right angles to the northwest trending faults. Extensive investigation of dikes present within the proposed landfill site [GSi/water, in GeoSyntec, 1993a] provides strong evidence that their occurrence post dates faulting in the area. The dikes have nearly vertical dips and are probably the result of igneous intrusion along tension fractures associated with ancient volcanism and regional tectonic stresses.

Range-border faulting (i.e, tension faulting at a boundary between a valley and mountain range) occurs along the eastern side of the Chuckwalla Valley parallel to the base of the Coxcomb Mountains (for Coxcomb Mountains, see Figure 2). This faulting may vertically displace bedrock beneath the valley nearly 0.6 miles (1 km) downward along the eastern side of the valley. However, no range-border faults are apparent along the eastern side of the Eagle Mountains.

Laterally continuous alluvial deposits occur at the Eagle Mountain range front. The alluvium extends from the floors of canyons within the proposed Eagle Mountain Landfill property in a thickening wedge into the down-drainage area of the Chuckwalla

Valley east and southeast of the site. These alluvial deposits underlie the Chuckwalla Valley (Figure 2).

The alluvium is of Quaternary age and extends basinward in wide zones along basin/mountain contacts. At a distance of 3 mi (5 km) from the eastern range-front of the Eagle Mountains, the alluvial fill reaches depths greater than 1,200 ft (360 m). Lithologically, the alluvium consists largely of gravel, gravelly sand, sand, clayey sand, and clay with the finer-grained clastics and clay content increasing generally basinward with distance from the mountain-range sources.

3.4.2 Hydrogeology

Ground water beneath the proposed Eagle Mountain Landfill site occurs largely in the previously-noted fractured metasedimentary and igneous intrusive rocks. The density of intersecting fractures in the bedrock is high, so the nature of ground-water flow beneath the site may be treated as equivalent to flow through porous media, as discussed later in this report. Recharge to the bedrock aquifer in the mountain ranges is very limited due to the low average rainfall and high evaporation rates. The ground-water table is on the order of several hundred to more than 1,000 ft (300 m) below the natural ground surface over most of the proposed landfill site. However, the bottom of the deepest part of the East Pit (see Figure 3 and Figure 5), which was excavated during past mining operations, may at times be a few feet below the ground-water table (based on August 1993 ground-water elevations). The preliminary engineering design for landfill Phase 5 provides for backfilling the deepest part of the East Pit with mine overburden and/or tailing materials to an approximate elevation of 900 ft (275 m) above sea level. This will place the bottom of the landfill liner system at this location approximately 180 ft (55 m) above August 1993 ground-water elevations. At the east end of Phase 5, the bottom of the liner system will be approximately 150 ft (45 m) above August 1993 ground-water elevations. Beneath the bottom of the Central Pit, a short distance outside the northwest perimeter of the landfill, the ground-water table is more than 1,000 ft (300 m) below the ground surface. Maximum depth to ground

water below the existing ground surface within the proposed landfill footprint is about 1,600 ft (490 m) at the north end of Phase 1 near the northwest corner of the footprint area.

The alluvial deposits that extend from the eastern edge of the Eagle Mountains and the proposed landfill site that fill the Chuckwalla alluvial basin (i.e., the Chuckwalla Valley) comprise the Chuckwalla aquifer. Ground water that is recharged to the bedrock flow system in the mountains flows southeastward and ultimately drains to the Chuckwalla alluvial aquifer as ground-water inflow. The Chuckwalla aquifer is also recharged by inflow from other mountain ranges that border it and by ground-water inflow from adjacent alluvial basins through gaps between the bounding mountain ranges. As shown in Figure 2, these other basin sources for the northwest half of the Chuckwalla Valley include the Pinto and Cadiz Valleys to the north of the Chuckwalla Valley and the Hayfield area in the eastern end of the Orocopia Valley west of the Chuckwalla Valley. Very little recharge to the Chuckwalla aquifer is thought to occur from direct infiltration of precipitation on the valley floor. Ground-water flow in the Chuckwalla aquifer is generally southeastward with some flow beneath the Palen and Ford Dry Lakes on its way to ultimate outflow to the Palo Verde Mesa Ground Water Basin (see Figure 2). According to Mann [1986], some ground water may discharge in the Palen Dry Lake area by evapotranspiration (ET) due to the relatively shallow ground-water table (i.e., about 20 ft (6 m) below ground surface) at that location. No natural discharge of ground-water by ET is thought to occur farther downgradient in the Ford Dry Lake area because the water table is too deep for plant roots to reach it. The hydrologic budget for the Chuckwalla aquifer is described in GeoSyntec [1995].

Ground-water quality within the bedrock saturated zone beneath the Eagle Mountain Landfill site is of the calcium-magnesium sulfate type. Total dissolved solids concentrations are on the order of 1,600 milligrams/liter (mg/l) with fluoride concentrations ranging from 1.0 to 1.9 mg/l. In contrast, ground water within the alluvial aquifer of the Chuckwalla Valley is of the sodium sulfate to sodium chloride type, with the concentration of total dissolved solids in the range of 400 to 1,000 mg/l, and with fluoride concentrations ranging from less than 1 to more than 13 mg/l.

Surface-water runoff associated with storm events constitutes the only known natural occurrence of surface water at the proposed landfill site. Run-off occurs temporarily after heavy precipitation, and is often rapid due to the topography, lack of significant vegetation, and intensity of rainfall (i.e., especially during summer thunderstorms). There are no natural springs or wetlands at the proposed Eagle Mountain Landfill site.

4. SITE GEOLOGY

4.1 Stratigraphy

4.1.1 Bedrock

Bedrock within the project area consists of Paleozoic metasedimentary rocks and Mesozoic igneous intrusive rocks. The metasedimentary rocks consist of former sandstone and conglomerate, arkose, and carbonate rock that were folded, faulted, metamorphosed, and hydrothermally altered to quartzite, meta-arkose, and marble, respectively. Igneous rocks include sills, dikes, and irregular bodies of porphyritic quartz monzonite, diorite, monzonite porphyry, granodiorite, and granite. As noted previously in this report, the metasedimentary rocks form a northwest-trending roof pendant within the igneous intrusive rocks. The iron ore zone at the site has an abundance of the minerals magnetite and hematite that have resulted from hydrothermal alteration of mostly carbonate metasedimentary rocks (i.e., dolomitic marble).

From older to younger, the lithologic units that comprise the bedrock at the proposed landfill site include: (i) *lower quartzite*, 1,000 ft (300 m) or more thick; (ii) *schistose meta-arkose*, 20 to 200 ft (6 to 60 m) thick; (iii) *lower marble*, 20 to 200 ft (6 to 60 m) thick; (iv) *middle quartzite*, 150 to 400 ft (45 to 120 m) thick; (v) *upper marble*, 50 to 400 ft (15 to 120 m) thick; *upper quartzite*, several hundred feet thick; (vi) *granitic rocks* comprising mostly quartz monzonite, monzonite porphyry, and granodiorite; (vii) *dikes*, (i.e., two types of systems, one mafic and oriented northwest-southeast, and the other andesitic, consisting of dikes composed of andesite and andesite porphyry oriented northeast-southwest); and (viii) *ore body* comprising mostly the minerals hematite and magnetite formed by hydrothermal replacement.

The ore body in the vicinity of the site was formed by replacement of metasedimentary rocks between two of the major metasedimentary units (i.e., the *lower quartzite* and *upper quartzite* lithologic units) and by replacement of porphyritic quartz monzonite. Hydrothermal alteration preceded ore deposition [DuBois, 1958].

4.1.2 Surficial Deposits

4.1.2.1 Alluvium

Unconsolidated deposits within the project area overlie the bedrock and consist of alluvial sands, silts, gravels, and debris-flow material laid down as channel and flood plain deposits. Mining by-products in the area are identified as those materials consisting of tailings and overburden from the former mining operations at the site.

Within the property boundaries of the landfill site, comparatively thin alluvial deposits of limited lateral extent occur in the narrow canyon bottoms. The alluvium thickens more or less continuously from the range-front eastward toward, and into, the Chuckwalla Valley. In the northern Chuckwalla Valley, the alluvial deposits are a few tens of feet thick along the western margin of the valley. The deposits range in thickness to more than 2,000 ft (600 m) in the eastern part of the valley. The older units near the site may correlate with the deeper sediments in Chuckwalla Valley. The alluvial deposits that cover bedrock on canyon floors within the landfill footprint thicken from zero, in the headward ends of the canyon, southeastward on the order of 50 ft (15 m) at the canyon outlets. These thicknesses were obtained from the results of seismic refraction surveys conducted by GSi/water [in GeoSyntec, 1992]. From results of a soil testing program described in Subsection 7.7 of the ROWD [in GeoSyntec, 1992], the alluvial deposits in the canyons may be classified using the Unified Soil Classification System (USCS) as sandy gravel (GW) with varying percentages of cobbles and boulders which, in some areas, dominate the soil matrix.

Debris flows are sedimentary deposits, formed as a heterogeneous mixture of fine and coarse particles, that move downslope as a slurry. Debris flows are able to transport rocks, including large boulders, more efficiently than flowing water. On the surface, the presence of underlying debris flows may be inferred by the presence of large bedrock boulders appreciable distances from the range-front.

The alluvial deposits contain debris flows throughout a large area east and southeast of the East Pit. A thick sequence of debris-flow material resting directly on bedrock is exposed in the walls of the East Pit [GSi/water, 1991d].

4.1.2.2 Mining By-Product Piles

Mining by-product piles contain tailings and overburden materials generated from former mining operations. Overburden has been deposited throughout the proposed landfill site. Tailings materials can be differentiated as fine and coarse. Fine tailings are located in several former sedimentation ponds southeast of the proposed landfill site. Coarse tailings are primarily deposited in a large pile south of the East Pit.

4.2 Structure

4.2.1 Bedrock

Structurally, the metasedimentary rocks at the project site are part of a large anticline trending generally west-northwesterly. The project site is situated on the north limb of the anticline. The dips of the beds in the vicinity of the project site range, on average, from 30° to 60° with shallower, or steeper, dipping beds in some locations.

Non-Holocene faults, shown in Figure 4, have been observed within the property boundaries of the proposed landfill [GSi/water in GeoSyntec, 1992, 1993a, and 1993c]. Throughout the area, the mapped faults have steep to nearly vertical dips. The

displacements along the faults range from approximately 1 ft (0.3 m) to several 100s of feet. The two most prominent faults within the bounds of the proposed landfill property are the Bald Eagle Canyon fault and a previously unnamed fault (termed "Fault A" by Proctor [1993]) situated about 4,600 ft (1,400 m) west of the Bald Eagle Canyon fault. Both faults trend southeasterly. Local faulting has been investigated by GSi/water [in GeoSyntec, 1993], Proctor [1993] and, Shlemon [1993], whose reports are presented as Appendices, U, X and Y, respectively, of the ROWD-SV1 [GeoSyntec, 1993a].

The Bald Eagle Canyon fault appears to have an oblique displacement, where the west side moved up relative to the east side, but movement also included right lateral offset. Horizontal and vertical components of displacement along the fault appear to be about equal. This observation is based on slickenside striations that plunge at about 45°. The amount of displacement is unknown. The fault consists of a series of splays, or a zone of faulting, which may exceed 1,000 ft (300 m) in width. It appears, through field examination and a review of technical literature, that the western side of the fault zone dips steeply to the east, whereas the eastern side of the fault zone dips moderately (i.e., in the range of 60° off the horizontal) to steeply to the west. The faults do not cut overlying Quaternary sediments (i.e., the alluvium) [Shlemon, 1993].

Right lateral movement characterizes the type of horizontal displacement along the unnamed fault west of the Bald Eagle Canyon fault. A dike, composed of porphyritic andesite, crosses the eastern splay or branch of Fault A (see Figure 4). As reported by GSi/water in the ROWD [GeoSyntec, 1992, 1993, and 1993c] and the ROWD-SV1 [GeoSyntec, 1993a], there is no observable offset of the dike, thus any significant fault movement occurred prior to dike intrusion. This finding, coupled with supplemental geologic investigations performed in early 1993, indicate that the last episode of active faulting at the site occurred more than 100,000,000 years before present. This conclusion is based on a variety of information and data, including potassium-argon (K-Ar) age-dating of the intrusive rocks that comprise the dikes that intersect the faults [GeoSyntec, 1993a].

Bedrock jointing at the site and in its vicinity is prominent and extensively interconnected. Joint systems are well developed. The most highly developed, or primary, system correlates with the trend of the major faults within the project area (i.e., northwest-southeast). The two predominant joint sets are approximately perpendicular to one another and trend northwest-southeast and northeast-southwest. Locally, there are north-south and east-west trends. Both sets are steeply dipping. A third set of joints is shallow-dipping with varying strikes. Detailed descriptions prepared by GSi/water of the joint systems in the vicinity of the Eagle Mountain Landfill site are given in Appendices C-4 through C-8 of the ROWD [GeoSyntec, 1992] and in Appendix AA of the ROWD-SV2 [GeoSyntec, 1993b].

4.2.2 Surficial Deposits

The Quaternary alluvial deposits that cover bedrock in the canyons on the proposed landfill site and extend in a thickening wedge eastward and southeastward into the Chuckwalla Valley from the site are tectonically undisturbed and slope or dip of bedding planes in the alluvium is topographically and gravity controlled. Studies by Shlemon [1993] and GSi/water [in GeoSyntec, 1993a] found no displacement of the alluvial deposits that overlie ancient faults on the project site.

5. SITE GROUND-WATER FLOW SYSTEM

5.1 Overview

The results of the hydrogeologic investigations performed at the Eagle Mountain Landfill site and vicinity from 1989 through 1993 and reported in the ROWD, ROWD-SV1, and ROWD-SV2 have enabled development of a detailed understanding of the nature of ground-water flow in bedrock beneath the site. Based on this understanding, an aerially extensive, reliable ground-water monitoring system has been developed for Phase 1 through 4 of landfill development.

The hydrogeologic conditions beneath the Eagle Mountain Landfill site, and the implications of these conditions for monitoring the quality of ground water that passes beneath the site, are discussed in the following subsections of this report. The critical elements of the occurrence and movement of ground water at the site and the data on which their interpretations are based are described.

5.2 Ground-Water Recharge Characteristics

The bedrock saturated zone beneath the proposed Eagle Mountain Landfill site receives recharge by underflow from upgradient areas and very limited vertically-downward infiltration of local precipitation through the unsaturated zone via the interconnecting fracture system in the bedrock. Because of steep surface slopes and sparse vegetation, runoff from occasional intense rain storms, such as from summer thunderstorms, is rapid; consequently, bedrock recharge from local precipitation is also limited. Based on an assumed value of 10 percent infiltration, and an average annual rainfall rate of 3.5 in. (90 mm), the average annual bedrock recharge rate is estimated to be 0.35 in. (0.9 mm) or less.

As part of landfill development, engineered surface-water management systems will prevent runon of storm water from adjacent areas into any developed landfill area. Rainfall that falls directly onto an active area of the landfill will be absorbed by waste and daily cover soil. As described in the ROWD, percolation of liquid (leachate) through the waste is not predicted due to the arid site conditions and the fact that the moisture content of the waste will be well below field capacity. Should leachate be developed, it will be contained and collected for safe disposal though operation of the engineered liner system and leachate collection system that will underlie the landfill. Thus, bedrock recharge within the landfill footprint will not occur after the landfill is developed.

5.3 Equivalency of Flow in Fractured Bedrock to Flow in Porous Media

5.3.1 Overview

If the hydrogeology of a fractured-rock ground-water flow system satisfies established criteria, flow in the system can be analyzed and interpreted according to the theory of flow through porous media. Establishing this equivalency for a site is beneficial to the development of a reliable and effective ground-water monitoring plan for that site. The conditions under which ground-water flow in fractured rock systems can be treated as equivalent to that occurring in porous-media systems have been considered by many researchers, among them Davis and DeWiest [1966], Snow [1969], Freeze and Cherry [1979], Todd [1980], Long et al. [1982], Kohut et al. [1983], Long and Witherspoon [1985], Gordon [1986], Lee et al. [1992], and Merin [1992]. Based on information from these and other references, as well as detailed investigations at test sites, the criteria for considering ground-water flow in fractured rock using a porous media flow model have been defined by the United States Environmental Protection Agency (USEPA) in documents titled "*Delineation of Wellhead Protection Areas in Fractured Rock*" [USEPA, 1991a] and "*Site Characterization for Subsurface Remediation*" [USEPA, 1991b].

The results of the hydrogeological investigations performed at the Eagle Mountain Landfill site were evaluated with respect to the reasonableness and appropriateness of conceptualizing the bedrock ground-water flow system at the site as equivalent to flow in porous media. The evaluation was based on criteria provided in USEPA [1991a,b]. These criteria are:

- smooth and continuous potentiometric surface;
- small fracture scale relative to area of influence as described by specific fracture properties;
- log normal distribution of hydraulic conductivity;
- porous media-like response to pumping tests; and
- relatively uniform composition of ground-water chemistry.

The detailed pattern of fracturing plays a significant role in determining the degree to which a fractured-rock ground-water flow system satisfies the criteria for porous-media equivalency. For example, the density, orientation, and aperture width of fractures control the interconnectedness of fracture sets, and therefore the magnitude and distribution of hydraulic conductivity and the smoothness of the potentiometric surface. The detailed pattern of fracturing is therefore a particularly important criterion in assessing whether a fractured-rock aquifer satisfies the porous-media equivalency assumption [USEPA, 1991a].

The following subsections of this report describe the way in which the characteristics of the fractured rock ground-water flow system at the Eagle Mountain Landfill site are compared to the criteria described in USEPA [1991a] to assess whether the porous-media equivalency assumption is reasonable and appropriate. In addition, these subsections describe the sources of data used to perform the comparison. Additional details of this investigation are presented in the ROWD-SV2.

5.3.2 Configuration of Potentiometric Surface

From May 1992 to December 1993, ground-water level measurements were obtained on a periodic basis from nearly 60 boreholes and wells at and around the project site. A complete tabulation of ground-water level measurements obtained from May 1992 through December 1993 at the site is presented in Table 1 of this report. Also included in Table 1 are updated ground-water level measurements made at 9 of the 60 observation points in August 1995. The locations of 37 of the piezometers, coreholes, and monitoring wells listed in Table 1 are shown on Figure 5 of this report. The majority of the remaining 23 observation points from Table 1 that are not shown on the map in Figure 5 are located to the east and southeast, off the map area in the Chuckwalla Valley. Data from 31 of the observation points shown on the map were used as control for the potentiometric surface map presented in Figure 5. Descriptive data on all 60 of the boreholes, piezometers and monitoring wells are contained in Table 2.

At a scale appropriate to the Eagle Mountain Landfill project, the potentiometric surface (Figure 5) is smooth and continuous, which is characteristic of a porous-media equivalent ground-water flow system. The potentiometric surface map does not exhibit a "stair-step" pattern that is characteristic of a conduit-controlled ground-water flow system. In particular, in fractured rock that has a sparse distribution of widely-spaced fractures, there is often a large contrast in hydraulic conductivities between the fracture zones and the adjacent blocks of unfractured host rock.

A review of measured water levels in boreholes and wells over time reveals that there has been a gradual decline in ground-water levels at the site since measurements began in May 1992. This decline in water levels has been consistent across the site in such a fashion that significant changes have not occurred in the configuration of the potentiometric surface [GeoSyntec, 1993b].

As indicated above, ground-water level elevations used in construction of the potentiometric-surface map presented in Figure 5 were obtained from 31 piezometers and monitoring wells located on the project site. Unless otherwise indicated on Figure 5, the ground-water level elevations used to establish the potentiometric surface map are from measurements made by GSi/water on 16 August 1993. The rationale for using the particular suite of control points and ground-water level data for the potentiometric-surface map is discussed in the following paragraphs.

Essentially all useable control points (i.e., measurable piezometers and monitoring wells) on the project site capable of providing meaningful data were utilized in the construction of the map shown in Figure 5. The six ground-water level observation points shown on Figure 5 that were not used for the map are all located south and southeast of the site and were not used largely because of their appreciable distance from the landfill boundary. Also, piezometers P-4 and P-5 are located south of an apparent potentiometric high that is present south of the project site.

The horizontal and vertical distribution of the wells and piezometers used had been previously established for a variety of reasons related to the information needs for the geologic and hydrogeologic investigation for the landfill project. The need for representative ground-water level data was but one of several factors considered. The high cost of the deep drilling required at the site necessitated optimum selection of the number and location of borings to meet a complex of information needs. This necessarily placed limits on the number and distribution of wells and piezometers available for any one category of hydrogeologic data. However, based on the extensive knowledge and understanding of the site hydrogeologic system developed in the course of the investigations performed for preparation of the ROWD, the available ground-water level data are adequate to accurately depict at the scale of the project the potentiometric surface of the uppermost aquifer and the direction of ground-water movement in the uppermost aquifer beneath the Eagle Mountain site.

The horizontal distribution of data is nonuniform. That is, relatively detailed clusters of data are available at two locations near the downgradient edge of the

proposed landfill footprint where pumping tests were performed and where the need for detailed subsurface data was most critical. Also, a fairly dense distribution of water-level control exists in the east bowl of East Pit. Elsewhere on the site, the observation points are relatively regularly dispersed. This broad but more or less regular distribution of control made it possible, in conjunction with surface geologic information, to collect representative hydrogeologic data across the site that comprise an acceptable degree of control. This is aided by the fact that the shape of the potentiometric surface is clearly reflective of the gross surface topography of the site. Considering the great depth of the water table below ground surface, and the low recharge rate, the potentiometric surface is a smoothed and subdued image of the ground-surface topography. The relatively steep potentiometric gradients in the upgradient parts of the project site are believed to be controlled by both the steep topography at these locations and the fact that the water table is at greatest depth in the upgradient areas. Fracture aperture widths diminish with depth as, to some extent, does fracture density. Consequently, hydraulic conductivity diminishes with depth, which helps explain the steeper gradients in the upgradient areas where the water table is at greater depth below ground surface than in the valleys. The relationship between the slope of the potentiometric surface and the corresponding surface topography and depth to ground water is illustrated graphically in hydrogeologic cross sections X-X, Y-Y, and Z-Z in Figures 6a and 6b.

No multiple-depth-completion wells or cluster wells (to observe possible differences in hydraulic head with depth) were installed at the site. There were several justifications for not including these types of observation points. These justifications are given below.

- Considering the cost to install multiple-well completions at several locations on this site, the clear and strong justification needed for such completions was lacking.

- The relatively low permeabilities encountered in the subsurface of much of the site limits the ability to identify and isolate zones that may be expected to

communicate with a well bore sufficiently to yield reliable differential head data, if it exists.

- Likely large differences in equilibration time of water levels measured at the same times at multiple depths at one location further complicate isolation-zone selection and acquisition of reliable differential head data at a single location.

Also, for a number of reasons, it is unlikely that vertical head differentials in the saturated zone of magnitudes important to the design and monitoring of the proposed landfill are present beneath the site. The reasons that significant vertical head differentials are unlikely to exist in the saturated zone beneath the site are given below:

- The extremely low recharge rates to the bedrock saturated zone in the project area (see Section 5.2), does not constitute a recharge condition that would induce significant downward vertical gradients.

- With no apparent significant natural discharge from the ground-water system on or near the site, significant upward vertical gradients are not expected in the essentially-unconfined bedrock saturated zone.

- With the reduction in fracture aperture width with depth plus, to a lesser degree, fracture density, and the consequent general reduction in hydraulic conductivity with depth, near-horizontal components of flow may be expected to dominate in the upper part of the saturated zone.

Because of the relatively low permeability of the bedrock beneath much of the site, relatively long well screens (i.e., mostly 50 to 100 ft (15 to 30 m) in length at control points used for the potentiometric surface map) were installed to assure adequate communication with the aquifer to either: (i) make it feasible to collect ground-water samples for analyses; or (ii) to facilitate reasonable equilibration times for collecting ground-water level measurements.

A review of the ground-water level data utilized to construct the potentiometric-surface map in Figure 5 reveals that at 19 of the 31 monitoring wells and piezometers from which ground-water level elevations were used for constructing the map, the static water level (SWL), when measured, was within the well screen or not far above the top of the screen (i.e., the screen intersected or its top was not far beneath the water table). At the remaining twelve observation points, the SWL was at a considerable height above the top of the screen (i.e., mostly in the range of 40 to 80 ft (12 to 24 m)). Eight of these twelve points were located in close proximity to the site of the P-20 aquifer pumping test and three of the remaining four wells were in close proximity of the Bald Eagle Canyon fault pumping test area. At a majority of these twelve observation points, the first water reported during the advance of the well boring was appreciably lower (i.e., in the depth range of where the well screen was ultimately installed) than the elevation of the SWL measurement collected from the finished well or piezometer and used for construction of the potentiometric-surface map. In these borings, the well screen was ordinarily installed not far below, or often intersecting the depth interval in which water was first encountered during drilling. In these areas, the aquifer may be semi-confined locally with the possibility for presence of a local upward vertical hydraulic gradient. However, because of the likely limited lateral extent of confinement if present, significant head change with depth is not expected.

5.3.3 Fracture Patterns

Three identified fracture sets (termed the primary, secondary, and tertiary sets) in bedrock beneath the site have widely distributed, and non-constant orientations, that satisfy the criteria described in USEPA [1991a]. The primary fracture set has a predominant orientation that is northwest-southeast and a steep dip (60° to 90°), the secondary fracture set is oriented northeast-southwest and is also steeply dipping. The tertiary fracture set has a distributed orientation and a generally low-angle dip (in the range of 20°). Primary fractures appear to parallel topographic features and the ancient fault zones mapped at the site.

The detailed characteristics of fractures in the bedrock beneath the site were evaluated by GSi/water [1991a,b,c; 1992b,c; 1993b] using four methods: (i) mapping of fracture properties at surface outcrops across the site; (ii) detailed fracture analyses of cores and/or videologs from 20 boreholes; (iii) evaluation of the relationship between fracture density and lithology using six corelogs from locations across the site; and (iv) inspection of select portions of six rock cores from locations across the site. Each methodology and the data developed from the application of each of the four investigative methods is discussed in detail in Section 5 and Appendix C of the ROWD [GeoSyntec, 1992], and in Section 19 and Appendices AA and BB of the ROWD-SV2 [GeoSyntec, 1993b].

For the equivalent porous-media assumption to apply, the density (i.e., the number per unit volume) of fractures should be high, especially with respect to the scale of the study area. The data from the investigations cited above indicate that the identified scale or spacing of major fractures at the Eagle Mountain Landfill site is high, ranging from less than two to more than nine over a distance of about 1 ft (0.3 m), or 7 to 30 fractures per meter (F/m), with numerous smaller fractures between the major fractures. In the saturated zone, the average spacing of open fractures with measurable apertures is approximately 1 every 6 in. (150 mm). This scale of fracturing is at least 1,000 times less than the scale of the Eagle Mountain Landfill project and satisfies the recommendations given in USEPA [1991a] that the scale of fracturing be at least 100 times less than that of the project for establishing porous-media equivalency.

For the equivalent porous-media assumption to apply, effective fracture aperture widths should be approximately constant and not widely distributed, whereas, conversely, the fracture orientation should be distributed and not constant. Fracture aperture widths in bedrock beneath the Eagle Mountain site were evaluated during surface mapping and through detailed analysis of data from 20 boreholes located across the site. Aperture widths were computed directly from the videologs for each fracture observed in the borehole interval with the sidescan camera. The results of these evaluations indicate that fracture aperture widths are consistent and fracture orientation

is distributed (as evidenced by the existence of primary, secondary, and tertiary fracture sets).

Data on average fracture aperture widths for the primary and secondary fracture sets are summarized in Section 19 of the ROWD-SV2. The data indicate that, as expected, aperture widths generally decrease with depth as the amount of overburden increases. The two graphs for aperture width versus depth in monitoring wells MW-7 and MW-8 in Figures 7a and 7b, respectively, are illustrative of this condition. Below a depth of about 400 ft (120 m) to at least the maximum depth of videologging (i.e., 876 ft (207 m)), average aperture widths remain relatively constant and in the range of approximately 0.008 in. (0.2 mm) and 0.02 in. (0.5 mm). A compilation of the range of average aperture widths, derived from analysis of videologs of the primary and secondary fracture sets, is presented in Table 19-4 of the ROWD-SV2.

As demonstrated from the foregoing discussion, the primary and secondary fracture sets mapped and analyzed in the investigations for the ROWD represent the dominant elements of the densely interconnected fracture system beneath the project site. Fracture apertures for the tertiary fracture set were generally observed to be closed within a few tens of feet of the ground surface. Although, this shallow low-angle fracture set likely provides important pathways for the initial infiltration of local recharge waters, the tertiary fracture set apparently does not contribute important ground-water flow pathways in the bedrock saturated zone beneath the site. Consequently, considering the appreciable depth of the water table everywhere beneath the site, the steeply to nearly vertically dipping primary and secondary fracture sets together comprise the equivalent porous-media ground-water flow system within the zone of saturation. Of the two sets, the primary or northwest-southeast fracture set is dominant. The mapped ancient faults and principal tributary canyons to Eagle Creek Canyon are coincident (i.e., parallel to) the primary fracture set.

Figure 5-24 of the ROWD [GeoSyntec, 1992] presents rose diagrams reproduced in this report as Figure 8. The diagrams represent the mapped occurrence of the primary, secondary, and tertiary fracture sets at the project site. The diagrams make

clear the intersecting character of the steeply dipping to nearly vertical primary and secondary fracture sets. It is clear from the site data that ground-water movement in the saturated zone is largely along densely-distributed, intersecting, steeply dipping to near-vertically oriented fractures. Therefore, the hydraulic conductivity values for the uppermost aquifer obtained in the course of the investigation, and discussed in the following section of this summary report, essentially represent the hydraulic conductivity of these densely intersecting fractures. Table 19-4 in the ROWD-SV2 [GeoSyntec, 1993b] and reproduced in this report as Table 3 lists average fracture aperture width and calculated hydraulic conductivity from detailed analyses of primary- and secondary-set fractures in boreholes at the project site. As noted earlier, these intersecting fractures are present in a density and a mode of distribution that meet the requirements for an equivalent porous media.

The verticality of the fractures that comprise the densely intersecting fracture system does not of itself imply the presence of significant vertical hydraulic gradients. As discussed previously in Subsection 5.3.2 of this report, vertical hydraulic gradients within the uppermost ground-water flow system beneath the project site are assumed to be minimal or practically lacking. This is because of the extremely low recharge rate and the lack of a discharge area on or near the site. If appreciable local recharge were occurring on the site, a significant downward vertical component of flow in the upper part of the saturated zone beneath the recharge area would be expected. Likewise, if discharge from the ground-water system were occurring on or near the project site, a significant upward component of flow would be expected in the saturated zone at or near to points of discharge. It is noted, however, that lack of a nearby discharge area does not preclude the possibility for ground-water underflow from upgradient of the project site in a deeper, locally-confined or semi-confined zone.

5.3.4 Distribution of Hydraulic Conductivity

In fractured-rock flow systems that satisfy the porous-media equivalency assumption, the distribution of hydraulic conductivity should be approximately log-

normal. In contrast, and as described previously, large contrasts in hydraulic conductivity can occur in fractured-rock ground-water flow systems that have a sparse distribution of widely-spaced fractures. These large contrasts in hydraulic conductivity can result in a distinct bi-modal distribution of hydraulic conductivity that is an indication that the fractured-rock flow system in question does not satisfy the porous-media equivalency assumption [USEPA, 1991a].

Estimates of hydraulic conductivity in bedrock beneath the Eagle Mountain Landfill site were obtained by GSi/water [in GeoSyntec, 1993b] using three sources of information: (i) effective fracture aperture widths as calculated from detailed fracture analyses of 19 boreholes; (ii) results of packer tests conducted in five coreholes; and (iii) pumping tests in the Bald Eagle Canyon Fault Zone and in the southern portion of the Phase 1 area of the landfill footprint.

As described by GSi/water in Appendices C-7 and C-8 of the ROWD, and in Appendix BB of the ROWD-SV2, bedrock hydraulic conductivity values were calculated for 19 boreholes and monitoring wells at the site based on effective fracture widths as determined during detailed fracture analyses. A compilation of the 262 calculated hydraulic-conductivity values is provided in Appendix BB of the ROWD-SV2. Statistical analyses of these data indicate that the data are log-normally distributed (see Figure 9) at a 95 percent confidence level (i.e., there is only a five percent probability that the probability distribution function of the population from which the sample is drawn is not log-normally distributed). Also shown is that the calculated hydraulic conductivities derived from evaluation of effective fracture widths have a geometric mean of 5.4×10^{-4} cm/s. The calculated values of hydraulic conductivity from effective fracture widths range from approximately 6×10^{-6} to 1×10^{-2} cm/s, with values generally decreasing with depth.

Bedrock hydraulic conductivity values were calculated using results from 39 straddle-packer tests conducted in five coreholes distributed over the site. These tests were conducted by isolating a 10-ft (3-m) long interval of borehole using inflatable packers, pressurizing the isolated borehole with water, and observing the decline in

water pressure over time. Detailed procedures for conducting the tests and interpreting the data are described in Appendix E-11 of the ROWD. Statistical analysis indicated that the calculated hydraulic conductivities from the packer tests follow a log-normal distribution with a geometric mean of 2×10^{-5} cm/s. The calculated hydraulic conductivity values from the straddle-packer test results range from 2×10^{-6} to 5×10^{-4} cm/s. Statistical analysis results presented in Section 19 of the ROWD-SV2 demonstrate that the bedrock hydraulic conductivities obtained for the 39 straddle-packer tests are log-normally distributed (see Figure 10).

The apparent explanation for the lower geometric mean for hydraulic conductivity calculated from the packer tests compared to calculations from effective fracture widths is a bias toward lower hydraulic conductivity values resulting from the need to set packers in parts of the borehole that penetrate the more competent, and consequently less permeable rock. A greater range of competency was observable from the fracture aperture-width analyses.

Ancient en-echelon faults noted earlier represent high (i.e., relatively) permeability zones in the bedrock flow system. This is recognized in the discussion of bedrock hydraulic conductivity in Section 19.4.2 of Supplemental Volume 2 (SV2) of the ROWD (GeoSyntec, 1993b), which states:

> "*The relationship between calculated hydraulic conductivity and depth generally parallels the relationship between fracture characteristics and depth. Accordingly, a decrease in hydraulic conductivity is generally observed with depth as both the aperture width and, to a lesser extent, the density of fracturing also decrease with depth. This relationship is discussed in more detail in Subsection 19.4.6. However, the same structural and lithologic factors that affect fracture characteristics also affect the calculated hydraulic conductivity. The calculated values of hydraulic conductivity cover a wide range from approximately* 6×10^{-6} *to* 1×10^{-2} *cm/s. The lower portion of the range (approximately* 6×10^{-6} *to* 1×10^{-3} *cm/s) is probably representative of the hydraulic conductivity of the relatively thick quartz monzonite in areas that*

have not been affected by such secondary factors as faulting or intrusion of dikes."

The upper portion of the range (approximately 1×10^{-3} to 1×10^{-2} cm/s) is probably representative of the hydraulic conductivity of more highly fractured zones associated with faulting or intrusions of the type identified during the P-20 pumping tests described in Subsection 19.5.2 of SV2 [GeoSyntec, 1993b]. The more fractured zones at the Eagle Mountain Landfill site occur much less frequently than do the less fractured zones. As a result, there are correspondingly fewer occurrences in Figure 9, of this summary report, of hydraulic conductivity values in the range of 1×10^{-3} to 1×10^{-2} cm/s than in the range of the geometric mean hydraulic conductivity.

The hydraulic conductivity distribution described above was fully taken into account in selecting point-of-compliance ground-water monitoring well locations. This is reflected in Section 20.3 of the ROWD-SV2 [GeoSyntec, 1993b] and discussed in Section 6.6 of this summary report.

In recognizing the densely fractured bedrock beneath the project site as equivalent-porous media with widely spaced zones of relatively high permeability closely associated with the en echelon faults, the bedrock might be conceptualized as a "fractured porous media" as defined in studies reported by E.A. Sudicky and his coworkers. Examples of their work have been reported in *Water Resources Research* and in *Ground Water*, including Tang, Frind, and Sudicky [1981], Sudicky and Frind [1982], and Feenstra, Cherry, Sudicky, and Zia Hag [1984]. Their work has dealt largely with the development of analytical solutions to problems of contaminant transport along discrete fractures in a porous rock matrix. An example would be a sandstone where the permeability of the porous matrix (i.e., the sandstone) is appreciably less than that of discrete single or parallel fractures that cut the porous matrix.

If one were to apply the term "fractured porous media" to the fractured bedrock beneath the Eagle Mountain project site, the main mass of fractured bedrock would

represent the porous media of Sudicky and others [1981, 1982, and 1984]. The en echelon fault zones would then necessarily represent their "discrete" fractures. However, in reality, the faults represent widely-spaced zones of relatively more densely fractured bedrock material that comprises shatter zones of an abundance of complexly intersecting fractures adjacent to the fault. These shatter zones represent relatively high-permeability, equivalent-porous media flow zones that provide preferential flow pathways bounded by relatively low-permeability zones that comprise the majority of the equivalent-porous media bedrock beneath the site. Therefore, the preferential pathways associated with the fault zones are most appropriately treated as equivalent-porous media rather than discrete fracture pathways. In this sense, the bedrock at the site is better conceptualized as a "nonhomogeneous equivalent-porous media" rather than a "fractured porous media."

In summary, hydraulic conductivities calculated from the detailed analysis of fracture data and packer-test data were separately evaluated to assess whether they are log-normally distributed. The statistical methods used in making the evaluations are described in Section 19 of the ROWD-SV2. As indicated by the bar graphs in Figure 9 and Figure 10, the statistical analysis of the hydraulic conductivity estimates show that the estimates are log-normally distributed, and therefore the estimates satisfy the porous-media equivalency criterion described in EPA [1991a].

5.3.5 Response to Pumping Tests

Two sets of multiple-well pumping tests were performed within the proposed landfill footprint, in areas shown on Figure 5, to evaluate whether the response of the ground-water flow system satisfies the equivalent porous-media criteria described above. The first set of tests, called the Bald Eagle Canyon Fault Zone pumping tests, was conducted in October 1992 in the immediate vicinity of the Bald Eagle Canyon Fault Zone. The second set of tests, termed the P-20 pumping tests, was performed during November 1993 near piezometer P-20 in the southern portion of the Phase I area of the landfill footprint. Detailed analyses of these pumping tests, performed by

Ground-Water Associates, Inc. [1993], are presented in Appendix FF of the ROWD-SV2 [GeoSyntec, 1993b].

The results of the pumping tests show that the ground-water flow system in the areas of the tests satisfy the applicable equivalent porous-media criteria of: (i) an approximately circular or elliptical cone of depression; (ii) smooth time-drawdown curves; and (iii) a linear relationship between discharge and drawdown in observation wells. The characteristic responses during pumping tests of ground-water flow systems are presented in Figure 11 of this report. The approximately circular or elliptical cones of depression for the P-20 pumping tests were presented on Figures 19-9, 19-10, 19-11, and 19-13 of the ROWD-SV2. The approximately elliptical cone of depression for the Bald Eagle Fault Zone test was presented on Figure 19-16 of the ROWD-SV2. The time-drawdown curves for both sets of tests are contained in Appendix FF of the ROWD-SV2. The linear discharge-drawdown relationship from the P-20 pumping test is presented on Figure 19-12 of the ROWD-SV2. A discharge-drawdown relationship for observation wells in the Bald Eagle Canyon Fault Zone pumping test could not be established because the pumping rates used were too low.

The transmissivities and storage coefficients calculated from the time-drawdown response observed in piezometers P-6, P-7, and P-8 in the Bald Eagle Canyon Fault Zone pumping test range from 40 to 600 gpd/ft (5.8×10^{-6} to 8.6×10^{-5} m^2/s) and 2×10^{-3} to 2×10^{-2}, respectively. The calculated hydraulic parameters using the results of the Bald Eagle Canyon Fault Zone test, presented in Table 19-9 of the ROWD-SV2, are in the same range as those calculated using the results of packer tests conducted in the more competent (less fractured) bedrock intervals.

The transmissivity and storage coefficient calculated using the results of the constant-discharge pumping test performed as part of the P-20 tests are in the range of 8,000 to 28,000 gallons per day per foot (gpd/ft), or 1.2×10^{-3} to 4.0×10^{-3} meters squared per second (m^2/s), and 4×10^{-4} to 3×10^{-3}, respectively.

The results of the P-20 pumping tests also indicated the presence of a northwest-southeast trending high-transmissivity feature that intersects piezometers P-17, P-19, P-20, and P-24 below the ground-water table. This feature most likely reflects the presence of one of the en echelon northwest-southeast trending steeply-dipping bedrock faults that have been mapped at the site (see Figure 4). Where they intersect the ground-water table, these faults, because of the highly fractured bedrock associated with them, form zones with high transmissivity within and along their alignment. The zones are surrounded by unfaulted bedrock, at significantly lower transmissivity. The hydraulic parameters calculated using the results of the constant-discharge tests are presented in Table 19-7 of the ROWD-SV2.

5.3.6 Ground-Water Chemistry

Ground water in porous-media equivalent flow systems usually has relatively uniform chemical composition through time and from place to place. In fractured rock that behaves as a conduit-flow system, ground water moving through fractures usually has less contact time with mineral surfaces and therefore can be lower in total dissolved solids and other minerals in comparison to ground water in porous-media equivalent flow systems with similar mineralogy. As a result, ground-water quality in fractured-rock flow systems that do not behave as equivalent porous-media can vary significantly through time and from place to place.

Ground-water quality sampling has been conducted for different lengths of time in the period July 1992 through June 1993 at monitoring wells MW-1 through MW-6, MW-7, and MW-10 through MW-13. The sampling methodologies and protocols used are described in the "*Work Plan for Ground-Water Sampling*" included as Appendix A to this report. Table 4 of this report presents the mean, maximum, and minimum concentrations of the major ions in the ground water at the site. A review of these data does not indicate a pattern of significant variations in ground-water chemistry over time. Analytical results find that ground water within the fractured bedrock is of the calcium-magnesium sulfate type.

Ground-water sampling was conducted in piezometer P-20 during the four-day constant-discharge pump test. Samples of ground water were obtained and analyzed after 1, 24, and 96 hours of pumping. The results of the analyses are presented in Table 5 of this report. The results show only very minor variations in major ion concentrations between sampling events.

Stiff diagrams were constructed using the mean values from Table 4 for major parameters for water samples from monitoring wells MW-1 through MW-7 and MW-10 through MW-13. The Stiff diagrams are presented in Appendix GG of the ROWD-SV2. A pattern of significant differences in the shapes of Stiff diagrams for water samples across the site would indicate spatial variations in ground-water chemistry. An evaluation of the diagrams does not indicate significant variations between samples from the eleven existing monitoring wells across the site. A Stiff diagram prepared from the mean values of parameters measured in water samples collected from piezometer P-20 (Table 5 of this report), and presented in Figure 19-19 of the ROWD-SV2, also compared favorably with the diagrams for the individual monitoring-well samples.

Worthy of note, however, is that carbonate and pH values for both monitoring wells MW-10 and MW-11 are abnormally high in relation to analytical results for ground-water samples collected from the other nine monitoring wells sampled periodically and for which analytical results are presented in Table 4 of this report. Also, carbonate and pH values are appreciably higher for well MW-11 than for well MW-10. A discussion of the anomalous MW-10 and MW-11 analytical results is provided in the following paragraphs.

Wells MW-10 and MW-11 were sampled a total of four times. The wells were first sampled in February of 1993, as part of a sampling program involving all of the monitoring wells at the site. The wells were also sampled in April (MW-11 only), May (MW-10 only), June, and September of 1993.

Well MW-10 is completed in the ore body, which contains abundant calcium carbonate mineral veins. The area also contains zones of skarn, a metamorphic rock

formed from carbonate-rich rocks, which also contain calcium carbonate minerals. Thus, the probable cause of the elevated pH and carbonate levels in MW-10 is dissolution of calcium carbonate mineral veins in the surrounding rock.

GSi/water considered the possibility that the elevated pH and carbonate levels in well MW-10 could have been caused by the sand-cement used in the annular seal. However, according to the construction log, the portion of the annular seal which contains sand-cement extends from the surface to a depth of 990 ft (300 m). This depth is above the depth of the static water level in the well. Since the sand-cement mixture does not extend into the saturated interval, it likely does not affect the chemistry of the ground water.

Well MW-11 has higher carbonate levels and a higher pH than MW-10. The likely cause of the elevated pH and carbonate levels is grout cement from the abandonment of corehole CH-11. The corehole is approximately 30 ft (9 m) from MW-11, and was drilled to a total depth of 1,100 ft (335 m). The borehole for MW-11 was drilled to a total depth of 1,130 ft (345 m), and the well was cased to a depth of 916 ft (280 m). The corehole was filled with grout cement on 28 July 1992. The calculated volume of the corehole was about 3 yd^3 (2.3 m^3). The actual amount of cement used was about 4.5 yd^3 (3.4 m^3). This suggests that some of the cement migrated through fractures into the surrounding rock. There is direct evidence that the cement affected local ground-water quality. During sampling activities in February of 1993, the sampling crew noted that the water had a "cement" odor. The cement could cause the local ground water to become more alkaline, as well as increase its carbonate content. The corehole log for CH-11 notes a moderate amount of calcite veins. Dissolution of calcite could also contribute to elevated carbonate levels in the ground water.

In summary, lack of significant variation in ground-water quality over the site indicates consistency with accepted criteria for porous-media equivalency.

5.3.7 Summary Comparison with Porous-Media Equivalency Criteria

A comparison of the properties of the fractured bedrock aquifer at the proposed Eagle Mountain Landfill site with the USEPA criteria for porous-media equivalency is presented in Table 6 of this report. Based on this comparison, it is concluded that the bedrock ground-water flow system beneath the Eagle Mountain Landfill site can be conceptualized as a nonhomogeneous equivalent-porous media. As a result, the ground-water data obtained from the hydrogeologic investigations of the site can be evaluated using the established principles of porous-media flow. Using these principles, the prerequisite information for an effective and reliable ground-water monitoring system can be defined, including upgradient and downgradient sides of the landfill, point of compliance, and flow directions and velocities. This information is discussed in the following section of this report.

5.4 Ground-Water Migration and Discharge

The direction of ground-water movement in the fractured bedrock beneath the Eagle Mountain Landfill site is down the slope of the potentiometric surface toward ultimate underflow to the Chuckwalla Basin alluvial aquifer as illustrated in the cross section in Figure 12. As described in Section 3.4 of this report, ground-water flow from the Eagle Mountains is to the northwestern Chuckwalla Ground-Water Basin and thence southeastward through the alluvial basin fill (i.e., the Chuckwalla aquifer) to ultimate discharge from the southeastern Chuckwalla Basin as subsurface inflow to the Palo Verde Mesa Ground-Water Basin (see Figure 2).

The potentiometric surface map for the Eagle Mountain Landfill site is shown in Figure 5 of this report. As can be seen in this figure, the potentiometric surface corresponds to a generally north to south ground-water flow direction over the northern and central portions of the Phase 1 and Phase 2 areas. Immediately south of the landfill footprint in the Phase 1 and Phase 2 areas, the ground-water flow direction changes from southerly to easterly. This change in direction occurs at the location of a west to

east ground-water trough that is approximately coincident with the Eagle Creek drainage adjacent to the south haul road. In the Phase 3 and 4 areas, the potentiometric surface corresponds to a northwest to southeast ground-water flow direction over most of the area. Along the southern boundary of the Phase 3 area, the ground-water flow direction becomes easterly at the location of the west to east ground-water trough. The trough is south of the landfill footprint in the Phase 4 area where it underlies the East Pit. The trough becomes less pronounced towards the east, in the direction of the Chuckwalla Valley (i.e., the Chuckwalla Ground-Water Basin). Relationships of the potentiometric surface to the land surface and to the subsurface geology is illustrated in hydrogeologic cross sections X-X, Y-Y, and Z-Z in Figures 6a and 6b.

The potentiometric gradient is greatest in the northern and central parts of Phase 1 and Phase 2 areas, where the gradient is about 0.12, or the equivalent of about 650 ft/mi (125 m/km). In the west to east ground-water trough at the southwesterly edge of the Phase 3 area, the gradient diminishes to about 0.03, or the equivalent of about 150 ft/mi (30 m/km). At the edge of the Chuckwalla Valley, the potentiometric gradient is in the range of about 0.015, or about 80 ft/mi (15 m/km).

The linear velocity of ground-water flow beneath the site depends upon the hydraulic conductivity within the fractured bedrock, potentiometric-surface gradient, and effective porosity of the fractures. As these parameters vary throughout the site, so will the average ground-water velocity. Based upon the available field data, most local velocities will fall within the range of 3 to 30 ft (1 to 10 m) per year. However, in parts of relatively high-permeability shatter zones in the vicinity of ancient en echelon faults found present at widely spaced locations on the site, local velocities may range between 500 and 1,000 ft (150 and 300 m) per year. Velocities along a given ground-water pathway will vary from point to point depending on fracture aperture, density of intersecting fractures, and other variations in aquifer characteristics. The high fracture density prevalent in the bedrock beneath the site tends to place the average effective porosity near the higher end of the expected range of one to five percent. Because the higher the porosity the lower the velocity, the overall average linear velocity beneath the landfill site is likely of the order of 10 ft/yr (3 m/yr) or less.

Downgradient (principally to the south and east of the landfill) of the Eagle Mountain Landfill site, ground water passes southeasterly from the bedrock ground-water flow system into the adjoining alluvium of the Chuckwalla aquifer. A cross section showing this bedrock/alluvium contact at the location of the east end of the East Pit is presented in Figure 12 and is also illustrated in hydrogeologic cross section Z-Z in Figure 6. The estimated average travel time for ground-water flow from the Central Pit northwest of the landfill, through the fractured bedrock beneath the landfill footprint to the alluvium of the Chuckwalla aquifer is in excess of 450 years (see Figure 12). Travel-time estimates are based on knowledge of average hydraulic conductivity, average potentiometric gradient, and estimates of average effective porosity [GeoSyntec, 1995].

Upon entering the Chuckwalla aquifer, ground water continues to migrate in a southeasterly direction toward the axis of the Chuckwalla Ground Water Basin and Palen and Ford Dry Lakes within the basin (see Figure 2). Some natural ground-water discharge from the basin may result from evapotranspiration in the vicinity of Palen Dry Lake where the ground-water table can be within 20 ft (6 m) of the ground surface. No natural ground-water discharge occurs at Ford Dry Lake where the water table is too deep to be reached by plant roots. Some ground water originally recharged to the bedrock flow system in the Eagle Mountains may ultimately be discharged from water supply wells in the Chuckwalla aquifer at locations in the northwestern half of the Chuckwalla Valley in pumping centers north of the town of Desert Center [GeoSyntec, 1995]. The majority of these wells are located 6 to 12 mi (10 to 20 km) southeast of the Eagle Mountain Landfill site. As noted in Figure 12, travel time for ground water recharged at the East Pit to reach the central part of this pumping area has been estimated to exceed 50 years [Geosyntec, 1995]. Beyond this area, ground water in the Chuckwalla aquifer continues to migrate southeastward into the southeastern half of the basin and to underflow to the Palo Verde Mesa Ground Water Basin (Figure 2).

5.5 Implications for Ground-Water Monitoring

As the result of the extensive geologic and hydrogeologic investigations of the proposed Eagle Mountain Landfill site and vicinity, the distribution of ground-water pathways beneath and adjacent to the site are well understood. This allows identification of representative ground-water monitoring points.

Conceptualization of the fractured bedrock ground-water flow system as occurring in a nonhomogeneous equivalent porous medium is a critical element in defining the distribution of ground-water pathways beneath the project site. As a consequence, this conceptualization is essential to establishing a reliable ground-water quality monitoring program in compliance with applicable regulatory requirements. The proposed ground-water monitoring program for the Eagle Mountain Landfill site and the monitoring regulatory requirements are discussed in Section 6.2 of this report.

6. GROUND-WATER MONITORING PROGRAM

6.1 Overview

Water-quality monitoring programs to meet state and federal regulatory requirements have been developed for the Eagle Mountain Landfill. The programs developed for landfill Phases 1 through 4 are described in the ROWD, ROWD-SV1, and ROWD-SV2 [GeoSyntec, 1992, 1993a,b]. WDRs incorporating these water quality monitoring programs were approved by the RWQCB on 17 May 1994. The WDRs also contained several additional program requirements that address monitoring parameters and reporting.

The ROWD and WDRs describe programs for monitoring the quality of: (i) surface water, (ii) unsaturated-zone liquids, and (iii) ground water. These programs were developed to fully satisfy State of California requirements contained in Article 5 of Chapter 15, which has been approved by the USEPA as part of state implementation of 40 CFR §258. The proposed ground-water monitoring program is intended to satisfy the regulatory requirements throughout the operational, closure, and post-closure maintenance periods for the landfill.

The ground-water monitoring program approved in the WDRs will need to be modified prior to development of Phase 5 of the landfill. This section of the report presents appropriate modifications to the plan. Also, the relevant regulatory requirements for monitoring ground-water quality are summarized, the point-of-compliance for the landfill is defined, and the suitability and reliability of the proposed ground-water monitoring-well network with respect to its effectiveness and compliance with the regulations is discussed.

6.2 Regulatory Requirements

A ground-water monitoring program at waste management units (WMUs) is required by Article 5 of Chapter 15. Requirements for ground-water monitoring systems are given in §2550.7 and §2550.8 of the article. The objectives of these requirements are to provide for the detection, characterization, and response to releases from the WMU to ground water. Article 5 has been approved by the USEPA as part of state implementation of 40 CFR §258. Federal requirements for ground-water monitoring and corrective action at nonhazardous WMUs are contained in 40 CFR §258. This section of the Code of Federal Regulations (CFR) establishes minimum national criteria under the Resource Conservation and Recovery Act (RCRA) for municipal solid waste landfill units and under the Clean Water Act for municipal solid waste landfills that also dispose of sewage sludge. The Eagle Mountain Landfill is proposed as a Class III landfill, so it will not receive sewage sludge.

Article 5 requires that the owner or operator of a WMU, such as the proposed Eagle Mountain Landfill, comply with the provisions of the article *"for purposes of detecting, characterizing, and responding to releases to ground water..."* The discussion in this subsection of this report addresses primarily the *"detection"* monitoring requirements of Article 5 for ground water. Article 5, however, also contains specific requirements for evaluation monitoring and corrective action programs. Section 11.3 of the ROWD includes discussions of key elements of the Article 5 requirements, including: (i) types of programs; (ii) water quality protection standards; (iii) constituents of concern; (iv) concentration limits; (v) points of compliance; (vi) monitoring points; (vii) compliance period; and (viii) monitoring parameters. The discussions that follow in this summary report are largely limited to definition and determination of the point-of-compliance and the rationale for the selection of monitoring points for the detection ground-water monitoring program for the uppermost aquifer at the site.

Article 5 requires that *"... the discharger institute a detection monitoring program under Section 2550.8 of [that] article..."* to detect any release of liquid to ground water, surface water, or unsaturated-zone liquid at the earliest possible time after such release may occur. The discharger is required *"... to install water quality monitoring systems that are appropriate for detection monitoring and that comply with the provisions of Section 2550.7 of [the] article..."*.

6.3 Uppermost Ground-Water Flow System

It has been established through the site characterization process that the materials containing the uppermost ground-water flow system beneath the landfill site consist largely of brittle, highly fractured igneous intrusive rocks, and brittle metasedimentary rocks that are also highly fractured. Site characterization investigations at the Eagle Mountain Landfill site reported in Section 5 of the ROWD and supplementary investigations reported in the ROWD-SV1 and ROWD-SV2 have found at least three identifiable, densely intersecting fracture or joint sets that are pervasive within the bedrock that contains the uppermost ground-water flow system beneath the site. As discussed in Section 5 of this report, the results of hydrogeologic investigations performed for the Eagle Mountain Landfill project demonstrate that ground-water flow in the system of intersecting bedrock fractures may be treated as equivalent to flow in porous-media. As summarized in Subsection 5.5 of this report, this equivalency to porous-media flow conditions has important implications for the monitorability of the site.

6.4 Ground-water Flow Direction

The direction of ground-water flow beneath the site is illustrated by the potentiometric-surface map presented in Figure 5 of this report. The direction of flow is downgradient and along pathways essentially perpendicular to the direction of the equipotential lines on the map. The ground-water flow direction is discussed in more

detail in Section 5.4 of this report, but beneath much of the site it is southeasterly, which is consistent with regional flow directions. West of the Bald Eagle Canyon fault, however, the flow direction is primarily southerly along the north perimeter of the landfill footprint and easterly along the south perimeter.

6.5 Point-of-Compliance

Section 2550.5(a) of Article 5 (Chapter 15) defines the point-of-compliance for ground-water monitoring as follows:

> *For each waste management unit, the regional board shall specify in the waste discharge requirements the point-of-compliance at which the water quality protection standard of Section 2550.2 of [the] article applies. The point-of-compliance is a vertical surface located at the hydraulically downgradient limit of the waste management unit that extends through the uppermost aquifer underlying the unit.*

The point-of-compliance for the Eagle Mountain Landfill with respect to Phases 1 through 4 is described in Subsection 11.3.6.1 of the ROWD as the downgradient limit of the landfill along the south haul road, East Pit maintenance road, and east haul road. The point-of-compliance so defined is shown in Figure 11-2 of the ROWD. With the inclusion of Phase 5, the point-of-compliance for the landfill is described as the downgradient limit of the landfill along the south haul road and the east haul road. The point-of-compliance so defined is shown in Figure 13 of this report.

The ground-water level data presented in the ROWD, ROWD SV-1, and ROWD SV-2, and updated through August 1995 on Table 1 in this report, are consistent and support the location of the point-of-compliance shown in Figure 13 of this report at the potentiometric downgradient limit of the proposed landfill footprint (also see Figure 5).

6.6 Suitability and Reliability of Monitoring-Well Network

Based on the hydrogeologic data in the ROWD, ROWD-SV1, and ROWD-SV2, ground-water levels and the distribution of ground-water flow directions beneath the site are well defined. Analysis of the data has led to a good understanding of the details of ground-water movement through the fractured bedrock in the saturated zone beneath the site. This understanding has allowed development of a ground-water monitoring network that meets the monitorability requirements of §2550.7(b)(1)(A) and (B) of Article 5.

The ROWD for the Eagle Mountain Landfill proposed a ground-water monitoring well network for landfill Phases 1 through 4 consisting of nine upgradient background wells and 26 downgradient point-of-compliance wells. (Note: As described below, a 27th downgradient well was subsequently added to the network proposed in the ROWD.) The proposed ground-water monitoring well network for Phases 1 through 4 is shown on Drawing 23 of the ROWD and in Figure 14 of this report. Proposed additions and other modifications to the network to meet ground-water monitoring requirements for landfill Phase 5 are shown in Figure 15 of this report. The rationale for locating monitoring wells is similar for all five phases of the Eagle Mountain Landfill. This rationale is discussed below.

Each well in the network will be screened in the uppermost saturated zone beneath the project site. Subsections 11.6.1.2, 11.6.2.1, and 11.6.2.2 of the ROWD provide the rationale for the proposed locations of the downgradient point-of-compliance wells. The rationale is also summarized in Section 17.3 of the ROWD-SV2. As described in Section 17.3 of the ROWD-SV2, point-of-compliance monitoring wells will be placed at the downgradient landfill boundary at locations designed to monitor ground water that has flowed: (i) beneath each of ten leachate collection and removal system (LCRS) sumps included in the design of Phases 1 through 4; (ii) beneath the two LCRS sumps that will be installed as part of Phase 5; (iii) beneath natural canyons within the landfill footprint; and (iv) along the alignment of the steeply dipping en echelon bedrock faults

at the site; and (v) at other locations to have a reasonably consistent lateral spacing of monitoring wells along the point-of-compliance. The investigations and analyses performed during preparation of the ROWD, ROWD-SV1, and ROWD-SV2 support the monitoring well placement strategy.

Based on the investigations and analyses performed for the ROWD-SV2, it was proposed to add existing piezometer P-20 to the downgradient point-of-compliance monitoring well network originally proposed in the ROWD. This additional well, to be designated MW-47, is located between previously-proposed monitoring wells MW-18 and MW-19 (see Figure 12). The proposed additional monitoring well is intended to provide additional monitoring capability in the vicinity of the intersection of the point-of-compliance with a zone of increased hydraulic conductivity associated with a probable northwest-southeast trending fault at this location (see Figure 4 of this report).

Figure 15 shows the modifications to the Eagle Mountain Landfill ground-water monitoring program proposed for the time period of activation and development of landfill Phase 5. The planned modifications consist of abandonment of several monitoring wells that will be installed during the development of Phases 3 and 4 and the construction of a number of new monitoring wells.

During Phase 5 development, eight monitoring wells previously installed during Phases 3 and 4 will be decommissioned and properly abandoned. All eight of these wells are located along parts of the potentiometric downgradient boundaries of Phases 3 and 4 that are common with or adjacent to the upgradient boundary of Phase 5. As indicated on Figure 15, the wells to be decommissioned are monitoring wells MW-32, MW-33, MW-34, MW-38, MW-39, MW-40, MW-41, and MW-42. Also shown on Figure 15, five new ground-water monitoring wells will be installed with the development of Phase 5. Four of the five new wells will be installed at the point-of-compliance along the south haul road and the fifth new well will be installed at the point-of-compliance along the east haul road. The five new monitoring wells will be located potentiometrically downgradient of the limit of the landfill containment system

for Phase 5. The process of selecting proposed locations for the five new monitoring wells was the same as for the first four phrases of landfill development.

As indicated by the foregoing discussion, the presence of en echelon bedrock faults at the site, and the effect on the ground-water flow system of the higher hydraulic conductivity zones associated with them, has been considered in the design of the ground-water monitoring well network. In this regard, monitoring wells are proposed at or near the intersection of mapped or suspected faults with the point-of-compliance. Furthermore, the higher degree of fracturing associated with faults causes increased fracturing of bedrock, thereby making these areas more susceptible to erosion and the subsequent creation of topographic relief. Because ground-water flow in fractured bedrock generally follows topography, monitoring wells have been located at the intersection of natural canyons with the point-of-compliance.

It is also noted that in developing the proposed locations of point-of-compliance monitoring wells, consideration was given to the presence of a west-to-east oriented ground-water trough at and immediately south of the landfill footprint. Ground water passing the point-of-compliance will be monitored by the 27 downgradient wells that will be progressively installed as Phases 1 through 4 of the landfill are developed and by the 24 downgradient wells that will comprise the monitoring system after Phase 5 is developed. The occurrence of a release to ground water is highly unlikely due to the arid climate, containment and collection capabilities of the liner system and LCRS, and monitoring, containment, and collection capabilities of the unsaturated zone liquid monitoring layer at the site. Should such an unlikely event take place, however, the opportunity for detection of the release will first occur at the closest downgradient point-of-compliance well. Subsequent opportunities for detection are provided by the point-of-compliance wells located to the east of the closest downgradient well. The wells to the east provide subsequent detection opportunities because of the west to east direction of ground-water flow along the aforementioned ground-water trough. The presence of the trough provides redundancy to the ground-water monitoring well network and also results in a zone of hydraulic control at and immediately south of the landfill footprint.

As discussed in the preceding paragraphs, extensive site-specific surface and subsurface investigations for the Eagle Mountain Landfill project have identified a number of en echelon faults, and monitoring wells have been proposed along each. Notwithstanding the extensive investigations already performed, the potential exists that minor fault structures, or zones of increased fracturing, exist at the project site.

The following approach will be used to account for possible now undefined additional faulting. Subphase-specific geotechnical investigations and studies are planned as part of the construction-level design for each subphase of Eagle Mountain Landfill development. These investigations and studies are required by specifications in the WDRs approved by the RWQCB. As part of this investigation, geologic field reconnaissance will be performed to confirm that the subphase does not include any previously unmapped geologic structures (e.g., faults) that could provide preferential-flow pathways past the point of compliance. Should such structures be identified, they will be investigated and the results of the investigation will be provided to the RWQCB in accordance with the WDR specifications. Recommendations for adjusting monitoring-well locations or adding wells to reflect the potential existence of such preferential-flow pathways will be provided to the RWQCB at that time.

6.7 Compliance of Monitoring-Well Network with Regulations

Article 5 of Chapter 15 requires that the discharger establish a ground-water monitoring system for the waste management unit (i.e., landfill). Requirements for ground-water monitoring systems are given in §2550.7 and §2550.8 of the article. The proposed ground-water monitoring system for the Eagle Mountain Landfill was developed to meet the requirements of §2550.7 for number, depth, location, and logging of monitoring wells, plus sampling, and analysis of laboratory results. The proposed system was also developed to meet the requirements of §2550.8 relative to establishing a list of monitoring parameters, constituents of concern, background values, maintenance of records of water quality data, and determination of statistically significant evidence of a release. How each of these regulatory requirements will be

met is described in detail in Section 11 of the ROWD [Geosyntec, 1992] with supplementary information provided in the ROWD-SV1 [GeoSyntec, 1993a] and ROWD-SV2 [GeoSyntec, 1993b]. By meeting the requirements of California's Chapter 15 for ground-water monitoring systems, the requirements of 40 CFR §258 are also met by the proposed ground-water monitoring program.

7. SUMMARY AND CONCLUSIONS

During the period 1989 through 1993, extensive geologic and hydrogeologic investigations for the Eagle Mountain Landfill site were performed by several firms, including SCS Engineers, GSi/water, Ground Water Associates, Inc. and GeoSyntec. The project is located in northeastern Riverside County, California, and is being developed by Mine Reclamation Corporation (MRC), Palm Desert, California. As part of the field investigations, a total of 51 boreholes, coreholes, piezometers, and monitoring wells were installed on or near the site for a cumulative total of about 50,000 ft (15,000 m) of subsurface drill hole advanced. A principal purpose of the investigation was to develop information on the occurrence and movement of ground water at the site. This information is needed to characterize the site and to develop a water-quality monitoring plan meeting state and federal regulatory requirements.

The results of the investigations and a proposed ground-water monitoring plan for Phases 1 through 4 of landfill development are described in the ROWD, ROWD-SV1, and ROWD-SV2 [GeoSyntec, 1992, 1993a,b]. These documents were submitted to the California RWQCB - Colorado River Basin, Region 7 in December 1992, June 1993, and December 1993, respectively. The RWQCB issued Waste Discharge Requirements (WDRs) for the Eagle Mountain Landfill on 17 May 1994.

This report, prepared by GeoSyntec at the request of MRC summarizes both the results of the hydrogeologic investigations and the technical demonstration of monitorability of the proposed Eagle Mountain Landfill site presented in the ROWD. The key findings of the hydrogeologic investigations are:

- Ground water beneath the Eagle Mountain Landfill site occurs largely in fractured igneous intrusive rocks that intrude older metasedimentary rocks.
- Relatively thin alluvial deposits overlying the igneous and metasedimentary bedrock in Eagle Creek Canyon and its tributary canyons at the site thicken

eastward and southeastward into the alluvium-filled Chuckwalla Valley east of the Eagle Mountains.

- Several sub-vertical intersecting fracture systems are present in the bedrock beneath the site, the dominant system being oriented in a northwest-southeast direction. The dominant fracture system includes several steep-angle faults. The first subordinate system of fractures intersects the primary system in a northeast-southwest direction.

- The density of intersecting fractures in the bedrock is high and results of the hydrogeologic investigation demonstrate that the nature of ground-water flow beneath the site meets USEPA [1991a] criteria for equivalency to flow through porous media. Because of widely spaced, relatively high-permeability zones of more highly fractured rock associated with several ancient bedrock faults at the site, ground-water flow at the site may be characterized as "nonhomogeneous equivalent-porous media flow."

- The bedrock hydraulic conductivity in the saturated zone beneath the site is in the range of 1×10^{-2} cm/s to 1×10^{-6} cm/s. The lower end of this range (approximately 6×10^{-6} to 1×10^{-3}) is considered to be representative of the hydraulic conductivity of the relatively thick quartz monzonite in areas not affected by secondary factors such as faulting. The upper portion of the range (approximately 1×10^{-3} to 1×10^{-2}) is considered to be representative of the hydraulic conductivity of more highly fractured zones associated with faulting that occurs as part of the primary northwest-southeast fracture set in the bedrock of the site.

- Ground-water levels along the perimeter of the proposed landfill footprint range in depth below existing ground surface from a maximum of about 1,600 ft (490 m) on the northwest to within a few feet of the bottom of the deepest part of the East Pit in development Phase 5. However, the design of Phase 5 will include backfilling that will result in a minimum separation of

approximately 150 ft (45 m) between the bottom of the liner system and the water table.

- The depth to ground water will be in excess of 300 ft (90 m) below the lowest waste level in the proposed landfill for landfill Phases 1 through 4, and, as noted above, approximately 150 ft (45 m) for landfill Phase 5.

- The ground-water flow direction beneath much of the site is southeasterly, which is consistent with regional flow directions. West of the Bald Eagle Canyon fault, however, the flow direction is primarily southerly along the north perimeter of the landfill footprint, turning easterly along the south perimeter.

- Based upon the available field data, most local linear velocities for ground water moving beneath the Eagle Mountain Landfill site in the fractured bedrock flow system will fall within the range of 3 to 30 ft (1 to 10 m) per year. However, in relatively high-permeable zones near en echelon faults found at widely spaced locations on the site, local velocities may range between 500 and 1,000 ft (150 and 300 m) per year. Velocities along a given ground-water pathway will vary from point to point depending on variations in aquifer characteristics. The overall average linear velocity beneath the landfill site is likely of the order of 10 ft/yr (3 m/yr) or less.

- Analyses of ground-water samples collected over time from eleven existing monitoring wells and one piezometer distributed over the site indicate insignificant variations in ground-water quality over time or space beneath the Eagle Mountain Landfill site.

Based on the detailed hydrogeologic information developed in the site investigation, the nature of ground water movement within the fractured bedrock beneath the Eagle Mountain Landfill site is well understood. The data shows that the densely-distributed intersecting fracture system in the bedrock meets criteria for porous-media equivalency

[USEPA, 1991a]. This facilitates analysis of the distribution of ground-water pathways. An accurate knowledge of the distribution of ground-water pathways beneath the site is important for establishing the monitorability of the quality of ground water moving from beneath the landfill. Therefore, a basic conclusion of the hydrogeologic investigations of the Eagle Mountain Landfill site is that the site can be effectively and reliably monitored.

A detailed ground-water monitoring plan is presented in Section 11 of the ROWD for landfill Phases 1 through 4 [GeoSyntec, 1992]. The plan is updated in the ROWD supplemental volumes ROWD-SV1 and ROWD-SV2 [GeoSyntec, 1993a,b]. The plan involves the phased installation and operation of 36 monitoring wells (i.e., 9 upgradient and 27 downgradient monitoring wells). These wells will be progressively installed as the landfill is developed.

Additionally, this summary report addresses the proposed additions and modifications proposed for the ground-water monitoring network to meet requirements for development of Phase 5 of the Eagle Mountain Landfill. As Phase 5 is developed, eight monitoring wells installed during previous phases of landfill development will be decommissioned and properly abandoned, while five new monitoring wells will be added to the monitoring well network.

The ground-water monitoring system consists of both upgradient wells, to monitor background ground-water quality, and downgradient wells placed at the point-of compliance to detect any impact, however unlikely, of landfill liquids on the ground water passing from beneath the landfill. The downgradient monitoring wells are placed so that any landfill impacts on ground-water quality will be detected at the earliest possible time. The occurrence of relatively high permeability flow zones that might be associated with the locations of canyons and ancient faults identified at the site has been considered in selecting locations for monitoring wells. The ground-water monitoring plan is designed to meet all state and federal requirements for monitoring a Class III landfill.

The engineering and operational measures proposed for the Eagle Mountain Landfill will result in a facility capable of reliably preventing landfill-related impacts to ground water. Because of the aridity of the site, little if any leachate development is expected. If some is developed it will drain to the engineered leachate collection and removal system with little potential for landfill liquids passing through the primary engineered liner system. In the unlikely event that any does, it will be intercepted by the unsaturated-zone liquid monitoring system immediately beneath the primary liner. The unsaturated-zone liquid monitoring system consists of a second liner system placed below the primary liner system under the base portions of the landfill. The second liner system provides a high degree of design redundancy, and a level of liquid containment capability that goes well beyond the minimum requirements of state and federal regulations.

REFERENCES

Davis, S.N. and DeWiest, R.J.M., "*Hydrogeology*", John Wiley & Sons, Inc., 1966.

DuBois, R.L., "*Report on Geologic Features Pertinent to Open Pit Design: Eagle Mountain Mine*", prepared for Kaiser Steel Corporation, Eagle Mountain, California, January 1958.

DWR (California Department of Water Resources), "*Valley Fill Areas and Other Water Bearing Materials*", Map 1:750,000, South Half, 1975.

Feenstra, S., Cheery, J.A., Sudicky, E.A., and Hag, Zia, "Matrix Diffusion Effects on Contaminant Migration from an Injection Well in Fractured Sandstone, *Ground Water*, Journal of Ground Water Technology Division of NWWA, Vol. 22, No. 3, May-June 1984.

Freeze, R.A. and Cherry, J.A., "*Groundwater*", Prentice-Hall, Inc., 1979, 604 p.

GeoSyntec Consultants, "*Report of Waste Discharge: Eagle Mountain Landfill and Recycling Center*", Volumes 1 through 8, prepared for Mine Reclamation Corporation, Palm Springs, California, December 1992.

GeoSyntec Consultants, "*Report of Waste Discharge: Eagle Mountain Landfill and Recycling Center*", Supplemental Vol. 1, prepared for Mine Reclamation Corporation, Palm Springs, California, June 1993a.

GeoSyntec Consultants, "*Report of Waste Discharge: Eagle Mountain Landfill and Recycling Center*", Supplemental Vol. 2, prepared for Mine Reclamation Corporation, Palm Springs, California, December 1993b.

GeoSyntec Consultants, "*Summary of Information on the Absence of Holocene Fault Displacement, Eagle Mountain Landfill and Recycling Center*", prepared for Mine Reclamation Company, Palm Springs, California, October, 1993c.

GeoSyntec Consultants, "*Evaluation of Ground-Water Usage Impacts, Proposed Eagle Mountain Pumped-Storage Hydroelectric Project*", prepared for Mine Reclamation Corporation, Palm Springs, California, March, 1995.

Gordon, M.J., "Dependence of Effective Porosity on Fracture Continuity in Fractured Media", *Ground Water*, Vol. 24, No. 4, July-August 1986, pp. 446-452.

Ground Water Associates, Inc., "*Pumping Tests Evaluations, MRC-Eagle Mountain Site, Riverside County, California*", prepared for GeoSyntec Consultants, Huntington Beach, California, December, 1993.

GSi/water, "*Results of Drilling and Construction of Piezometers No. 17, 18, and 19, Proposed Eagle Mountain Landfill Site, Riverside County, California,*" prepared for Mine Reclamation Corporation, Palm Springs, California (6 July) 1993a.

GSi/water, "*Detailed Fracture Analysis of Piezometers 17, 20, and 21, Proposed Eagle Mountain Landfill Site, Riverside County, California*", prepared for Mine Reclamation Corporation, Palm Springs, California, (October 27) 1993b.

GSi/water, "*Geohydrologic Interpretation of Temperature Logs, Piezometers P-17, P-18, P-19, P-20, P-21, P-22, P-23, and P-24, Proposed Eagle Mountain Landfill Site, Riverside County, California*", prepared for Mine Reclamation Corporation, Palm Springs, California, (29 November) 1993c.

GSi/water, "*Results of Drilling and Construction of Piezometers P-20, P021, P-22, P-23, and P-24, Proposed Eagle Mountain Landfill Site, Riverside County, California*", prepared for Mine Reclamation Corporation, Palm Springs, California (30 November) 1993d.

GSi/water, "*Ground Temperature Survey at Eagle Mountain Mine, Riverside County, California*", 1990.

GSi/water, "*Detailed Fracture Mapping of the Proposed Landfill Site, Eagle Mountain Mine, Riverside, California*", 1991a.

GSi/water, "*Fracture Mapping Outside the East Pit, Eagle Mountain Mine, Riverside, California*", 1991b.

GSi/water, "*Fracture Mapping in the East Pit, Eagle Mountain Mine, Riverside County, California*", 1991c.

GSi/water, "*Nature of the Alluvium, Eagle Mountain, California*", 1991d.

GSi/water, "*Results of the Detailed Gravimetric Investigation, Eagle Mountain, Riverside County, California*", 1991e.

GSi/water, "*Interpretation of Temperature Logs of Monitoring Wells, Eagle Mountain Riverside County, California*", 1991f.

GSi/water, "*Brief Description of Surface Geology to Accompany the Geologic Map of the Proposed Eagle Mountain Landfill Site, Eagle Mountain, California*", 1992a.

GSi/water, "*Detailed Fracture Analysis of Monitoring Wells 7, 8, and 9*", proposed Eagle Mountain Landfill Site, Riverside County, California, 1992b.

GSi/water, "*Detailed Fracture Analysis of Piezometers 1-10 and 13, and Monitoring Wells 11, 12, and 13*", proposed Eagle Mountain Landfill Site, Riverside County, California, 1992c.

Kohut, A.P., Foweraker, J.C., Johanson, D.A., Tradewell, E.H., and Hodge, W.S., "*Pumping Effects of Wells in Fractured Granitic Terrain*", October 1983, pp. 564-572.

Lee, R.R., Ketelle, R.H., Bownds, J.M., and Rizk, T.A., "Aquifer Analysis and Modeling in a Fractured, Heterogeneous Medium," *Ground Water*, Vol. 30, No. 4, July-August 1992, pp. 589-596.

Long, J.C.S., Remer, J.S., Wilson, C.R., and Witherspoon, P.A., "Porous Media Equivalents for Networks of Discontinuous Fractures", *Water Resources Research*, Vol. 18, No. 3, June 1982.

Long, J.C.S. and Witherspoon, P.A., "The Relationship of the Degree of Interconnection to Permeability in Fracture Networks", *Journal of Geophysical Research*, Vol. 90, No. B4, 10 March 1995, pp. 3087-3098.

Mann, J.F., Jr., "*Ground Water Conditions in the Eagle Mountain Area*", Report to Kaiser Steel Corporation, 28 March 1986.

Merin, I.S., "Conceptual Model of Ground Water Flow in Fractured Siltstone Based on Analysis of Rock Cores, Borehole Geophysics, and Thin Sections", *Ground-Water Monitoring Review*, Fall 1992, pp. 118-125.

Proctor, R.J., "*Faults and Micro-Seismicity Investigations and Conclusions; Proposed Eagle Mountain Landfill Site, Riverside County, California*", prepared for Mine Reclamation Corporation, Palm Springs, California, May 1993.

SCS Engineers, "*Background Ground-Water Quality Monitoring Program, Eagle Mountain California*", prepared for Mine Reclamation Corporation, Norwalk, California, May 1990.

Shlemon, R.J., "*Updated Report, Geomorphic and Soil-Stratigraphic Age Assessments, Alluvial Deposits, Proposed Eagle Mountain Landfill Site, Riverside County, California*", prepared for Mine Reclamation Corporation, Palm Springs, California, May 1993.

Snow, D.T., "Anisotropic Permeability of Fractured Media", *Water Resources Research*, Vol. 5, No. 6, December 1969, pp. 1273-1289.

Sudicky, E.A., and Frind, E.O., "Contaminant Transport in Fractured Porous Media: Analytical Solutions for a System of Parallel Fractures," *Water Resources Research*, Vol. 18, No. 6, December 1982, pp. 1634-1642.

Tang, D.H., Frind, E.O. and Sudicky, E.A., "Contaminant Transport in Fractured Porous Media: Analytical Solution for a Single Fracture," *Water Resources Research*, Vol. 17, No. 3, June 1981, pp. 555-564.

Todd, D.K., "*Groundwater Hydrology*", Second Edition, John Wiley & Sons, Inc., 1980, 535 p.

U.S. Environmental Protection Agency, prepared by Wisconsin Geological and Natural History Survey, "*Delineation of Wellhead Protection Areas in Fractured Rocks*", EPA 570/9-91-009, Office of Ground Water and Drinking Water, June 1991a, 144 p.

U.S. Environmental Protection Agency, "*Seminar Publication: Site Characterization for Subsurface Remediation*", EPA 625/4-91/026, Office of Research and Development, November 1991b, 259 p.

TABLE 1

STATIC WATER LEVEL ELEVATION **
EAGLE MOUNTAIN LANDFILL

BOREHOLE NUMBER	5/6/92 ft	5/20/92 ft	6/3/92 ft	6/17/92 ft	7/1/92 ft	7/15/92 ft	7/29/92 ft	8/13/92 ft	8/26/92 ft	9/28/92 ft	11/6/92 ft	2/4/93 ft
MON. WELLS												
MW-1	706.15	706.37	705.97	705.78	705.95	706.63	706.44	705.15	705.15	705.40	705.15	704.65
MW-2	686.01	685.84	685.84	685.26	685.26	685.16	684.26	683.84	683.93	683.76	683.09	682.51
MW-3	758.09	757.84	746.01	756.06	755.72	755.26	755.34	756.01	753.38	753.63	752.92	755.38
MW-4	703.90	703.69	703.69	703.19	702.69	703.57	703.61	702.61	702.73	700.27	701.57	699.86
MW-5	699.78	699.79	699.55	699.32	698.71	699.34	699.07	697.86	698.73	697.69	697.28	696.15
MW-6	772.14	772.22	772.15	771.77	768.54	(20)	769.39	769.56	771.89	771.10	769.72	768.81
MW-7	(20)	916.45	914.46	615.90	915.82	915.74	(20)	915.49	918.90	918.95	916.73	919.73
MW-8(OLD)	(16)	(16)	(16)	(16)	(16)	(16)	(15)	(15)	(15)	(15)	(15)	(15)
MW-8(NEW)	(20)	938.53	937.56	635.80	936.84	938.08	939.75	933.92	937.04	937.37	936.92	937.90
MW-9	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)
MW-10	1464.85	1448.44	1439.06	1427.27	1415.27	1271.06	1285.23	1285.32	1292.82	1305.98	1313.32	1316.26
MW-11	(20)	(20)	(20)	944.17	(20)	943.17	916.92	918.25	942.96	915.79	918.59	920.92
MW-12	863.65	862.72	859.11	857.91	855.44	854.56	852.62	848.44	846.40	842.14	836.61	827.94
MW-13	776.23	774.11	757.73	762.77	763.61	761.89	756.64	760.94	758.40	756.42	755.05	756.34
COREHOLES												
CH-02	(20)	(20)	(20)	1120.33	1116.92	1115.67	1121.44	(20)	1117.79	(20)	1118.46	1113.11
CH-03	NE	NE	NE	NE	NE	NE	(15)	(15)	(15)	(15)	(15)	(15)
CH-3A	976.75	(20)	903.36	907.33	908.87	907.59	912.63	902.92	906.09	905.88	906.67	(20)
CH-04	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)
CH-5A	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	795.45	797.26	809.12
CH-10	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
CH-11	(20)	(20)	(20)	(20)	(20)	(20)	(15)	(15)	(15)	(15)	(15)	(15)
CH-12	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(15)	(15)	(15)
PIEZOMETERS												
P-1	699.37	700.27	700.49	699.45	698.24	698.79	698.41	697.37	697.66	697.08	696.03	694.53
P-2	917.49	917.49	917.62	917.70	918.91	920.26	922.32	916.33	920.03	920.99	919.45	920.74
P-3	736.48	736.31	735.40	735.19	735.27	734.97	733.52	733.02	733.31	735.10	732.77	731.39
P-4	(16)	(16)	(16)	(16)	913.25	919.25	(20)	916.83	918.87	928.79	917.83	919.75
P-5	(16)	(16)	(16)	(16)	(16)	918.08	(20)	915.75	917.75	917.33	916.42	919.00
P-6	791.36	790.88	786.02	782.38	779.51	775.76	772.42	769.01	766.74	766.63	762.26	769.84
P-7	756.29	765.39	755.79	752.75	754.34	753.67	758.28	754.38	751.84	752.13	751.38	753.59
P-8	779.02	780.71	774.68	767.10	766.14	764.35	763.53	763.14	762.60	761.18	758.81	760.22
P-9	(17)	582.60	582.18	582.85	582.85	583.06	582.10	584.35	582.18	582.39	583.20	582.44
P-10	(17)	582.82	583.03	583.23	582.98	583.50	582.07	584.23	582.49	(20)	585.50	583.40
P-11	(17)	576.34	577.65	577.39	578.01	579.01	578.14	580.68	578.34	578.72	578.72	578.20
P-12	(17)	(17)	(17)	511.02	504.42	505.53	503.73	505.28	502.28	501.36	501.38	502.03
P-13	(17)	(17)	(17)	799.25	799.68	799.97	802.05	800.97	800.63	774.81	766.13	766.96
P-14	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	1028.31	973.60
P-15	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	1043.14	1041.16
P-16	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	1017.20	990.02
P-17	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)
P-18	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)
P-19	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)
P-20	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)
P-21	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)
P-22	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)
P-23	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)
P-24	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)
DRILL HOLES												
DH-421	686.18	685.93	686.33	686.10	686.02	686.33	685.90	687.60	685.97	686.35	686.64	678.02
DH-411	673.19	673.03	673.17	672.80	672.73	672.67	672.03	670.74	671.82	671.69	671.86	671.03
DH-H	654.73	654.98	654.94	654.71	656.89	655.60	684.68	655.31	653.85	653.77	653.71	652.81
DH-X1	645.45	645.49	645.54	645.00	647.04	646.45	645.29	646.95	644.21	644.33	643.08	643.08
DH-Y	685.75	675.58	675.83	675.50	675.33	675.65	674.58	676.75	674.50	674.79	674.33	674.25
DH-410	670.12	669.62	669.92	669.65	671.29	669.96	669.04	670.54	668.46	668.04	668.16	667.04
DH-415	682.88	682.71	683.17	682.88	683.04	682.73	682.58	684.50	682.88	683.09	683.69	684.04
DH-424	698.67	698.76	690.88	698.51	698.42	698.00	697.13	697.05	698.13	699.84	696.72	696.42
MISC. WELLS												
SCHOOL	(20)	716.70	713.70	713.45	712.78	713.16	711.32	710.95	711.03	711.20	(20)	708.62
CW#1	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)
CW#2	(20)	(20)	(20)	469.50	470.42	469.00	469.34	471.94	468.83	469.50	470.02	469.96
CW#3	(20)	(20)	(20)	(20)	(20)	(20)	474.67	476.17	475.04	474.79	469.67	475.17
CW#4	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)
KAISER MW	669.41	669.16	666.41	665.03	668.99	668.86	668.08	667.74	667.99	667.62	667.87	666.74

ES:
NE – NOT ENCOUNTERED
*APPROXIMATE ELEVATIONS
**Source: GSi/water (1993)
(*)SWL FOR 2/11/93
(1) Pioneer Drilling
(2) Beylik Drilling
(3) Layne Environmental Drilling
(4) Not Constructed
(5) Tonto Drilling
(6) Harris Drilling
(11) Video Log
(12) E-Log, Gamma Log, Caliper Log, Sonic Log
(13) E-Log
(14) Photos Taken of Core
(15) Hole Abandoned
(16) Obstruction in Borehole
(17) Borehole Not Yet Completed
(18) No Casing
(19) Information Unavailable
(20) SWL Could Not Be Obtained

TABLE 1 (Continued)

STATIC WATER LEVEL ELEVATION **
EAGLE MOUNTAIN LANDFILL

BOREHOLE NUMBER	2/18/93 ft	3/3/93 ft	3/18/93 ft	4/1/93 ft	4/15/93 ft	4/28/93 ft	5/11/93 ft	5/27/93 ft	6/16/93 ft	7/15/93 ft	8/16/93 ft	9/30/93 ft	11/5/93 ft	11/10/93 ft
MON. WELLS														
MW-1	704.13	703.40	701.61	701.24	701.09	701.05	701.16	700.58	700.83	700.40	700.14	700.05	699.39	
MW-2	681.32	681.09	678.18	678.99	678.52	678.50	678.41	678.57	678.01	677.41	677.11	676.87	675.15	
MW-3	756.06	755.21	752.65	751.75	750.84	750.31	750.18	749.02	748.26	747.26	746.09	751.27	751.89	
MW-4	699.65	697.35	696.61	696.25	696.02	695.74	695.54	695.08	694.93	694.21	693.13	693.36	692.97	
MW-5	695.84	694.85	693.61	693.36	693.17	693.09	692.86	692.26	692.42	691.80	691.24	690.81	690.45	
MW-6	766.97	768.18	764.37	764.79	764.36	764.72	764.59	764.29	766.05	762.61	762.39	763.19		760.55
MW-7	916.13	915.27	916.21	917.31	916.97	918.27	918.45	918.35	918.41	916.22	916.35	919.55		915.77
MW-8 (OLD)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	
MW-8(NEW)	934.04	929.46	930.29	931.04	931.37	931.57	932.24	932.41	932.56	930.29	930.17	931.69	931.84	
MW-9	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	
MW-10	1320.53	1290.89	1335.04	1351.80	1347.73	1341.47	1203.39	1230.74	1257.62	1264.37	1243.53	1243.53	1277.51	
MW-11	918.54	916.52	915.37	918.67	911.78	917.10	917.58	917.52	917.58	917.42	915.55	916.68	916.93	
MW-12	826.40	799.32	802.12	805.37	807.48	793.02	800.69	806.39	808.50	801.62	808.27	811.06	806.46	
MW-13	758.67	758.79	755.83	755.62	753.34	752.66	752.62	751.42	751.03	749.78	749.19	765.06	758.01	
COREHOLES														
CH-02	1118.71	1125.41	1124.46	1114.15	1114.70	1114.60	1115.34	1115.42	(20)	(20)	(20)	(20)	(20)	
CH-03	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	
CH-3A	907.25	908.22	901.91	904.67	904.45	904.87	904.60	904.54	903.56	900.42	896.46	892.88	889.25	
CH-04	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	
CH-5A	810.53	815.18	811.39	814.97	814.97	815.66	816.00	815.34	815.55	815.03	814.81	812.06	809.46	
CH-10	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	1131.16
CH-11	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	
CH-12	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(16)	(15)	
PIEZOMETERS														
P-1	694.14	693.90	692.10	694.36	693.28	694.86	694.91	695.27	692.40	691.93	691.59	691.01	690.10	
P-2	921.79	917.52	918.10	921.74	921.91	922.18	922.29	922.42	922.36	922.41	922.49	923.97	924.06	
P-3	730.87	732.71	729.39	729.90	729.75	728.66	728.45	728.05	727.70	727.21	727.76	729.18	729.97	
P-4	919.62	917.80	918.12	917.14	918.19	917.94	917.81	917.81	917.69	917.71	917.87	918.02	918.13	
P-5	918.92	916.15	916.62	915.20	916.39	916.01	915.97	915.97	915.85	915.89	915.92	916.19	916.43	
P-6	770.34	772.09	769.81	766.65	764.09	761.85	760.28	758.60	756.55	757.70	752.69	832.15	792.28	
P-7	754.05	755.12	752.60	751.79	750.96	749.98	749.38	748.83	747.86	747.05	745.90	750.61	751.09	
P-8	761.31	763.97	761.24	763.69	758.73	757.42	756.29	755.01	753.55	751.86	749.99	790.01	774.17	
P-9	582.04	583.97	581.28	581.20	581.15	580.92	580.95	580.97	581.17	580.64	580.67	580.47	580.35	
P-10	583.09	585.41	582.17	582.48	582.89	582.70	582.74	582.80	582.75	582.64	582.56	582.41	582.30	
P-11	577.54	579.24	577.28	577.11	577.10	576.90	576.97	577.04	576.96	576.78	576.59	576.39	576.34	
P-12	501.13	502.72	501.31	500.83	500.73	500.52	500.64	500.50	500.43	500.23	500.13	500.02	500.03	
P-13	766.80	763.15	758.09	763.51	763.50	763.90	762.90	763.37	762.17	761.82	761.25	761.71	762.45	
P-14	976.63	970.53	970.69	969.69	968.99	968.25	967.78	967.24	966.71	966.19	965.58	964.69	964.28	
P-15	1043.03	1045.86	(20)	1041.46	1040.83	1041.13	1041.72	1041.39	1042.04	1039.23	(20)	(20)	(20)	
P-16	988.52	989.31	983.36	983.78	983.30	982.49	982.26	981.85	981.49	(20)	(20)	(20)	(20)	
P-17	917.29	913.03	913.80	914.52	914.50	914.50	914.71	914.62	914.48	914.63	914.56	915.27	915.71	
P-18	(17)	914.43	915.34	916.33	916.09	915.28	915.57	916.46	916.41	916.52	916.40	917.43	918.02	
P-19	(17)	(17)	902.08	902.56	902.67	902.72	904.32	904.31	904.20	903.22	904.27	905.01	905.52	
P-20	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)		911.23
P-21	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	916.20	916.32	
P-22	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	926.82	919.30	
P-23	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	915.30	915.49	
P-24	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	910.80		912.99
DRILL HOLES														
DH-421	686.58	688.31	687.21	686.77	686.69	686.67	686.47	686.51	686.55	686.52	687.46	686.82	686.79	
DH-411	670.46	671.61	670.04	669.77	669.53	669.58	669.30	669.15	669.00	668.67	668.39	667.88	667.46	
DH-H	652.21	653.53	651.81	651.52	651.17	651.15	650.98	650.67	650.47	650.34	649.79	649.44	649.22	
DH-X1	642.74	643.64	642.37	642.22	641.86	641.89	641.30	640.85	640.54	640.49	640.01	639.78	639.66	
DH-Y	674.00	675.10	673.88	673.30	673.29	673.06	672.76	672.56	672.61	672.56	671.44	(20)	(20)	
DH-410	666.81	667.71	667.21	665.69	665.67	665.60	665.35	665.18	664.91	664.74	664.40	663.91	663.51	
DH-415	683.50	684.57	683.35	683.20	683.16	683.27	683.16	680.68	684.57	683.58	684.66	683.87	683.88	
DH-424	695.61	696.79	694.96	694.56	694.40	694.56	694.82	694.06	693.50	693.61	693.05	692.63	692.24	
MISC. WELLS														
SCHOOL	708.82	711.16	707.50	708.13	(20)	699.30	709.95	709.34	709.29	705.79	705.70	705.54		706.69
CW#1	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	
CW#2	470.60	471.15	469.62	468.83	469.40	469.38	468.00	469.15	468.90	469.02	469.27	469.73	469.25	
CW#3	473.98	476.00	474.67	473.21	474.31	474.39	475.22	475.68	474.16	474.00	474.30	474.29	474.10	
CW#4	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	
KAISER MW	666.74	667.94	666.56	665.96	665.86	665.74	665.94	665.57	665.32	664.94	664.55	664.49	663.74	

NOTES:

NE – NOT ENCOUNTERED
*APPROXIMATE ELEVATIONS
**Source: GSI/water (1993)
(*) SWL FOR 2/11/93
(1) Pioneer Drilling
(2) Beylick Drilling
(3) Layne Environmental Drilling
(4) Not Constructed
(5) Tonto Drilling
(6) Harris Drilling
(11) Video Log
(12) E-Log, Gamma Log, Caliper Log, Sonic Log
(13) E-Log.
(14) Photos Taken of Core
(15) Hole Abandoned
(16) Obstruction in Borehole
(17) Borehole Not Yet Completed
(18) No Casing
(19) Information Unavailable
(20) SWL Could Not Be Obtained

TABLE 1 (Continued)

STATIC WATER LEVEL ELEVATION**
EAGLE MOUNTAIN LANDFILL

BOREHOLE NUMBER	12/9-12/14/93 SWL ELEV. ft	8/9-8/10/95 SWL ELEV. ft
MON-WELLS		
MW-1	698.91	694.38
MW-2	674.67	
MW-3	750.27	
MW-4	692.66	
MW-5	689.76	
MW-6	765.45	
MW-7	919.79	916.11
MW-8 (OLD)	(15)	
MW-8 (NEW)	935.92	
MW-9	(16)	
MW-10	1293.00	
MW-11	920.35	915.09
MW-12	809.41	805.97
MW-13	755.09	
COREHOLES		
CH-02	(20)	
CH-03	(15)	
CH-3A	890.07	
CH-04	(20)	
CH-5A	807.57	
CH-10	1117.84	
CH-11	(15)	
CH-12	15)	
PIEZOMETERS		
P-1	689.71	685.02
P-2	923.62	
P-3	729.90	
P-4	917.96	
P-5	916.39	915.50
P-6	775.50	
P-7	748.96	737.59
P-8	766.25	740.27
P-9	580.15	
P-10	582.22	
P-11	576.29	
P-12	499.95	
P-13	762.60	
P-14	(20)	(20)
P-15	(20)	(20)
P-16	(20)	(20)
P-17	915.98	
P-18	916.49	
P-19	906.65	
P-20	911.87	912.38
P-21	913.29	
P-22	914.47	
P-23	914.67	
P-24	910.10	
DRILL HOLES		
DH-421	686.64	
DH-411	667.12	
DH-H	649.05	
DH-X1	639.58	
DH-Y	(20)	
DH-410	663.17	
DH-415	683.90	
DH-424	691.73	
MISC. WELLS		
SCHOOL	707.10	
CW#1	(20)	
CW#2	469.43	
CW#3	474.22	
CW#4	(20)	
KAISER MW	663.54	

NOTES:
NE - NOT ENCOUNTERED
* APPROXIMATE ELEVATIONS
**Source: GSi/water
(*) SWL for 2/11/93
(1) Pioneer Drilling
(2) Beylick Drilling
(3) Layne Environmental Drilling
(4) Not Constructed
(5) Tonto Drilling
(6) Harris Drilling
(11) Video Log
(12) E-Log, Gamma Log, Caliper Log, Sonic Log
(13) E-Log
(14) Photos Taken of Core
(15) Hole Abandoned
(16) Obstruction in Borehole
(17) Borehole Not Yet Completed
(18) No Casing
(19) Information Unavailable
(20) SWL Could Not Be Obtained

TABLE 2

BOREHOLE DATA SUMMARY SHEET **
EAGLE MOUNTAIN LANDFILL

BOREHOLE NO.	GROUND ELEVATION ft	DEPTH DRILLED ft	BOTTOM ELEVATION ft	DEPTH TO BED-ROCK ft	CASING BOTTOM DEPTH ft	CASING BOTTOM ELEV. ft	DEPTH OF SCREENED INTERVAL FROM ft	DEPTH OF SCREENED INTERVAL TO ft	HOLE SIZE in	DATE DRILLING BEGAN	HEIGHT OF CASING ft	ELEVATION OF 1ST WATER ft	NOTES
MON. WELLS													
MW-1	1045.03	400	645.03	NE	385	660.03	325	385	10 0	4/27/89	2.29	706.79	(1)
MW-2	1083.01	455	628.01	NE	455	628.01	394	455	10 0	3/26/90	2.00	688.11	(2)
MW-3	1048.84	380	668.84	1	350	698.84	289	350	8 0	4/04/90	1.25	765.41	(3)
MW-4	795.73	140	655.73	0	140	655.73	80	140	10 0	3/20/91	4.17	705.29	(3)
MW-5	911.86	245	666.86	235	240	671.86	180	240	10 0	3/24/91	2.00	703.12	(3)
MW-6	1347.89	640	707.89	460	620	727.89	560	620	10 0	3/21/91	2.75	781.31	(3)
MW-7	1605.82	785	820.82	0	726	880.32	666	726	10 6	9/11/91	2.33	915.82	(4)
MW-8(OLD)	1768.54	964	804.54	1	(18)	(18)	(18)	(18)	6 3	9/26/91	(18)	858.54	(5)
MW-8(NEW)	1768.54	871	897.54	1	844	925.04	792	844	13 5	3/31/92	4.46	900.54	(6)
MW-9	2296.92	1544	752.92	1	(19)	(19)	(19)	(19)	6 5	10/12/91	(19)	(19)	(7)
MW-10	2311.35	1214	1097.65	7	1173	1138.35	1069	1173	13 5	2/16/92	3.22	1805.35	(8)
MW-11	1783.25	1130	653.25	20	917	866.55	863	917	13 5	3/01/92	0.92	858.25	(9)
MW-12	1206.77	550	656.77	37	430	776.77	365	430	13 5	3/22/92	3.17	716.77	(6)
MW-13	1051.48	420	631.48	3	366	685.48	260	365	13 8	4/13/92	2.19	741.48	(6)
COREHOLES													
CH-2	2288.21	1179	1109.21	10	1179	1109.21	1129	1179	3 8	2/21/92	2.92	1168.21	(10)
CH-3	1758.67	676	1082.67	10	(18)	(18)	(18)	(18)	3 8	3/06/92	(18)	NE	(11)
CH-3A	1758.67	905	854.17	10	900	858.57	850	900	3 0/3 8	3/21/92	1.08	899.67	(12)
CH-4	1905.98	930	975.98	10	(18)	(18)	(18)	(18)	3 0/3 8	3/12/92	1.42	1030.98	(10)
CH-5A	1657.20	900	757.20	13	900	757.20	850	900	3 0/3 8	4/06/92	1.50	866.20	(10)
CH-10	2307.76	1389	918.76	7	1389	918.76	1339	1389	3 8	2/13/92	0.25	998.76	(10)
CH-11	1781.59	1100	681.59	19	(18)	(18)	(18)	(18)	3 8	4/14/92	(18)	871.59	(13)
CH-12	1207.69	525	682.69	37	(18)	(18)	(18)	(18)	3 8	5/12/92	(18)	737.69	(10)

NOTES:

NE-NOT ENCOUNTERED
*APPROXIMATE ELEVATIONS
**Source: GSI/water (1993)
(*) SWL FOR 2/11/93
(1) MUD ROTARY BY PIONEER DRILLING
(2) AIR ROTARY BY BEYLIK DRILLING
(3) REVERSE CIRC. HAMMER BY LAYNE ENVIRONMENTAL DRILLING
(4) AIR HAMMER BY BEYLIK DRILLING
(5) AIR HAMMER BY BEYLIK, NOT CONSTRUCTED, AND HOLE ABANDONED
(6) AIR HAMMER BY TONTO DRILLING
(7) AIR HAMMER BY BEYLIK DRILLING AND NOT CONSTRUCTED
(8) MUD ROTARY BY TONTO DRILLING
(9) MUD ROTARY & AIR HAMMER BY TONTO DRILLING & E-LOG, GAMMA LOG, CALIPER LOG, SONIC LOG
(10) CORE BY TONTO DRILLING & PHOTOS TAKEN OF CORE
(11) CORE NOT CONSTRUCTED, TONTO DRILL & HOLE ABANDONED
(12) CORED/TRICONE 0-122 FT PHOTOS TAKEN OF CORE
(13) CORE TONTO DRILL, PHOTOS TAKEN/CORE & HOLE ABANDONED
(18) NO CASING
(19) INFORMATION UNAVAILABLE

TABLE 2 (continued)

BOREHOLE DATA SUMMARY SHEET **
EAGLE MOUNTAIN LANDFILL

BOREHOLE NO.	GROUND ELEVATION ft	DEPTH DRILLED ft	BOTTOM ELEVATION ft	DEPTH TO BED ROCK ft	CASING BOTTOM DEPTH ft	CASING BOTTOM ELEV. ft	DEPTH OF SCREENED INTERVAL FROM ft	DEPTH OF SCREENED INTERVAL TO ft	HOLE SIZE in	DATE DRILLING BEGAN	HEIGHT OF CASING ft	ELEV. OF 1ST WATER ft	NOTES
PIEZOMETERS													
P-1	676.70	270	606.70	15	257	619.70	207	257	5 625	3/20/92	2.75	676.70	(14)
P-2	1744.16	960	784.16	20	955	789.16	905	955	6 5-6 25	3/23/92	2.00	889.16	(14)
P-3	1241.77	675	566.77	161	663	578.77	613	663	6	3/27/92	1.63	681.77	(15)
P-4	1384.50	625	759.50	34	625	759.50	575	625	5 5	4/09/92	1.06	830.50	(15)
P-5	1387.00	625	762.00	37	625	762.00	575	625	5 5	4/11/92	2.00	862.00	(15)
P-6	1052.51	425	627.51	0	409	643.51	309	409	5 5	4/22/92	2.63	767.51	(14)
P-7	1050.96	425	625.96	0	423	627.60	373	423	5 5	4/24/92	2.42	775.96	(14)
P-8	1050.60	400	650.60	0	373	677.60	323	373	5 5	4/25/92	2.29	695.60	(14)
P-9	1012.60	525	487.60	260	520	492.60	470	520	5 625	4/29/92	0.75	537.60	(15)
P-10	1111.62	675	436.62	180	675	436.62	625	675	5 625	5/07/92	2.33	541.62	(15)
P-11	930.34	485	445.34	NE	470	460.34	350	470	5 5	5/12/92	2.28	505.34	(16)
P-12	843.67	500	343.67	NE	500	343.67	450	500	5 625	5/20/92	2.69	423.67	(17)
P-13	1326.97	725	601.97	0	725	601.97	675	725	5 5	6/07/92	2.41	676.97	(15)
P-14	2340.68	1390	950.68	150	1374	966.68	1311	1374	5 5	9/30/92	1.91	1000.68	(16)
P-15	1642.59	1314	528.59	0	804	1038.59	741	804	6 5	10/28/92	1.65	1092.59	(14)
P-16	1705.31	730	975.31	0	723	982.31	660	723	6 5	11/11/92	1.92	1045.31	(18)
P-17	1707.81	1000	707.81	0	1000	707.81	895	1000	6	2/14/93	1.05	827.81	(19)
P-18	1715.49	955	760.49	0	945	775.49	835	940	6	2/19/93	0.59	875.49	(20)
P-19	1727.67	1005	722.67	30	995	732.87	895	995	6/5 5	3/11/93	1.51	852.67	(16)
P-20	1731.47	1050	681.47	45	1020	711.47	870	1020	12	8/22/93	2.00	871.47	(20)
P-21	1722.56	1000	722.56	45	968	754.56	863	968	6	8/29/93	1.70	862.56	(20)
P-22	1701.74	980	721.74	35	948	753.74	843	948	6	8/31/93	2.25	841.74	(20)
P-23	1692.32	960	732.32	0	945	747.32	882	945	6	9/19/93	1.65	872.32	(20)
P-24	1746.36	1010	736.36	40	968	778.36	863	968	6	9/26/93	6.00	901.36	(20)

NOTES:
NE-NOT ENCOUNTERED
*APPROXIMATE ELEVATIONS
**Source: GSI/water (1993)
(*) SWL FOR 2/11/93
(14) AIR HAMMER BY HARRIS DRILLING & VIDEO LOG
(15) AIR HAMMER & SIM-CASE BY HARRIS DRILLING & VIDEO LOG
(16) AIR HAMMER & SIM-CASE BY HARRIS DRILLING
(17) AIR HAMMER & SIM-CASE BY HARRIS DRILLING & E-LOG
(18) AIR HAMMER BY HARRIS DRILLING & E-LOG
(19) DUAL-TUBE REVERSE CIRC. BY HARRIS DRILLING & VIEDO LOG
(20) DUAL-TUBE REVERSE CIRC. BY HARRIS DRILLING, VIDEO LOG & E-LOG, GAMMA LOG, CALIPER LOG, SONIC LOG

TABLE 2 (continued)

BOREHOLE DATA SUMMARY SHEET **
EAGLE MOUNTAIN LANDFILL

BOREHOLE NO.	GROUND ELEVATION ft	DEPTH DRILLED ft	BOTTOM ELEVATION ft	DEPTH TO BED-ROCK ft	CASING BOTTOM DEPTH ft	CASING BOTTOM ELEV. ft	DEPTH OF SCREENED INTERVAL FROM ft	DEPTH OF SCREENED INTERVAL TO ft	HOLE SIZE in	DATE DRILLING BEGAN	HEIGHT OF CASING ft	ELEVATION OF 1ST WATER ft	NOTES
DRILL HOLE													
DH-421	975.52	1075	-99.48	570	(19)	(19)	(19)	(19)	(19)	11/27/54	1.58	(19)	
DH-411	928.48	(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)	0.88	(19)	
DH-H	910.48	1530	-619.52	961	(19)	(19)	(19)	(19)	(19)	11/23/54	1.08	(19)	
DH-X1	871.29	1280	-408.71	1270	(19)	(19)	(19)	(19)	(19)	01/03/55	1.58	(19)	
DH-Y	915.08	1548.5	-633.42	1158	(19)	(19)	(19)	(19)	(19)	02/03/55	0.67	(19)	
DH-410	972.41	(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)	0.63	(19)	
DH-415	978.71	(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)	0.25	(19)	
DH-424	1064.42	(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)	0.17	(19)	
MISC. WELLS													
SCHOOL	1234.7	749.5	485.2	211.5	740	494.7	475	740	15.75/10	(19)	1.75	(19)	(21)
CW#1	742*	1328	-586*	(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)	(22)
CW#2	793*	887	-94*	(19)	535	258*	331	527	(19)	(19)	1.00	(19)	(22)
CW#3	737*	699	38*	(19)	570	167*	273	562	(19)	(19)	0.50	(19)	(22)
CW#4	699*	660	39*	(19)	500	199*	170	410	(19)	(19)	(19)	(19)	(22)
KAISER MW	978.49	(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)	2.25	(19)	

NOTES:
NE-NOT ENCOUNTERED
*APPROXIMATE ELEVATIONS
**Source: GSI/water (1993)
(*) SWL FOR 2/11/93
(19) INFORMATION UNAVAILABLE
(21) ROTARY
(22) MUD ROTARY

TABLE 3

AVERAGE FRACTURE APERTURE WIDTH AND CALCULATED HYDRAULIC CONDUCTIVITY FROM DETAILED FRACTURE ANALYSES[1] EAGLE MOUNTAIN LANDFILL

PIEZOMETER/MONITORING WELL	RANGE OF AVERAGE APERTURE WIDTH (cm)	RANGE OF CALCULATED HYDRAULIC CONDUCTIVITY (cm/s)
P-1	0.02 - 0.06	5×10^{-4} - 1×10^{-2}
P-2	0.01 - 0.05	3×10^{-5} - 6×10^{-3}
P-3	0.01 - 0.08	9×10^{-5} - 2×10^{-2}
P-4	0.01 - 0.04	3×10^{-5} - 4×10^{-3}
P-5	0.01 - 0.04	9×10^{-6} - 6×10^{-3}
P-6	0.01 - 0.04	1×10^{-4} - 3×10^{-3}
P-7	0.005 - 0.02	9×10^{-6} - 1×10^{-3}
P-8	0.01 - 0.02	1×10^{-4} - 1×10^{-3}
P-10	0.01 - 0.03	6×10^{-5} - 2×10^{-3}
P-13	0.005 - 0.03	6×10^{-6} - 2×10^{-3}
P-17	0.01 - 0.04	8×10^{-4} - 3×10^{-3}
P-20	0.01 - 0.04	6×10^{-5} - 4×10^{-3}
P-21	0.01 - 0.04	6×10^{-5} - 3×10^{-3}
MW-7	0.04 - 0.08	(Not Calculated)
MW-8	0.02 - 0.11	(Not Calculated)
MW-9	0.04 - 0.09	(Not Calculated)
MW-11	0.01 - 0.05	8×10^{-5} - 8×10^{-3}
MW-12	0.02 - 0.05	2×10^{-4} - 2×10^{-2}
MW-13	0.01 - 0.05	1×10^{-4} - 8×10^{-3}

Note: [1] This table was developed using data from GSi/water as presented in Appendices C-7 and C-8 of the ROWD and Appendix AA of this report.

TABLE 4

SUMMARY OF STATISTICS OF GROUND-WATER QUALITY JUNE 1989 THROUGH JUNE 1993 QUARTERLY SAMPLING[1] EAGLE MOUNTAIN LANDFILL

WELL		PARAMETER[2]												
		Na	K	Cl	HCO_3	SO_4	Mg	pH	TDS	Ca	Mn	Fe	CO_3	NO_3(N)
MW-1														
	Max	128	4	150	110	150	5	8.2	480	34	3.5	13	BRL[3]	28
	Min	102	4	76	85	72	3	7.4	380	16	0.12	0.30	BRL	0.30
	Mean	117	4	100	96	107	4	8.0	434	24	0.94	3.2	BRL	10
MW-2														
	Max	182	7	140	52	480	23	8.6	940	99	11	0.63	BRL	29
	Min	184	7	120	24	390	12	7.6	825	81	0.02	0.10	BRL	6.2
	Mean	170	7	133	40	430	16	8.1	895	89	2	0.37	BRL	12
MW-3														
	Max	140	12	130	140	1470	133	8.1	2480	324	93	0.96	BRL	31
	Min	116	12	33	113	1200	93	7.5	2090	290	0.10	0.05	BRL	4.6
	Mean	113	12	79	116	1388	110	7.8	2231	309	19	0.37	BRL	12.5
MW-4														
	Max	455	12	190	183	3000	272	8.0	4430	529	0.27	0.33	BRL	74
	Min	178	12	150	61	400	42	7.6	1050	96	0.02	0.06	BRL	4
	Mean	163	12	176	95	751	50	7.9	1514	246	0.10	0.19	BRL	27
MW-5														
	Max	195	10	160	76	610	23	8.1	1170	131	BRL	0.07	BRL	61
	Min	175	10	150	49	450	15	7.7	1070	117	BRL	0.07	BRL	13
	Mean	187	10	156	60	506	19	8.0	1098	123	BRL	0.07	BRL	24
MW-6														
	Max	255	16	180	189	810	60	8.0	1480	164	0.37	0.21	BRL	30
	Min	180	10	140	146	610	40	7.7	1250	160	0.16	0.10	BRL	2
	Mean	122	13	159	172	709	51	7.8	1395	163	0.24	0.16	BRL	9

TABLE 4 (Continued)

SUMMARY OF STATISTICS OF GROUND-WATER QUALITY
JUNE 1989 THROUGH JUNE 1993 QUARTERLY SAMPLING[b]
EAGLE MOUNTAIN LANDFILL

WELL		PARAMETER[a]												
		Na	K	Cl	HCO_3	SO_4	Mg	pH	TDS	Ca	Mn	Fe	CO_3	NO_3(N)
MW-7														
	Max	171	7	97	232	190	8	8.2	685	44	0.38	0.95	BRL	0.60
	Min	171	6	79	214	150	8	7.8	570	38	0.20	0.05	BRL	0.20
	Mean	171	7	84	220	168	8	8.0	617	42	0.31	0.39	BRL	0.48
MW-10														
	Max	280	13	100	67	350	1	9.7	865	10	BRL	0.07	36	8
	Min	265	7	98	64	330	1	9.7	865	3	BRL	0.07	36	5
	Mean	273	10	99	66	340	1	9.7	865	7	BRL	0.07	36	7
MW-11														
	Max	260	17	79	BRL	110	1	11.6	865	32	0.03	1.2	138	0.90
	Min	220	13	71	BRL	61	1	11.4	815	24	0.03	0.09	51	0.20
	Mean	242	15	75	BRL	83	1	11.5	840	28	0.03	0.53	84	0.43
MW-12														
	Max	370	15	860	107	340	30	7.9	2190	275	0.31	BRL	BRL	7
	Min	164	7	250	79	150	9	7.8	930	79	0.08	BRL	BRL	0.9
	Mean	248	10	490	91	230	17	7.9	1560	154	0.17	BRL	BRL	4
MW-13														
	Max	460	40	160	177	2900	269	8.1	4560	494	0.24	0.11	BRL	17
	Min	180	10	140	73	460	41	7.8	1120	103	0.02	0.05	BRL	4
	Mean	355	30	153	142	2053	192	8.0	2840	360	0.12	0.09	BRL	9

Notes:
Data from GSI/water as presented in Appendix E-4 of the ROWD and from Browning-Ferris Industries.
[a] Data are in milligrams per liter (mg/l).
[b] BRL - Below Reporting Limits.

TABLE 5

RESULTS OF GROUND-WATER QUALITY SAMPLING IN PIEZOMETER P-20 DURING CONSTANT-DISCHARGE PUMP TEST[1] EAGLE MOUNTAIN LANDFILL

DESCRIPTION OF SAMPLE	PARAMETER[2]												
	Na	K	Cl	HCO_3	SO_4	Mg	pH	TDS	Ca	Mn	Fe	CO_3	NO_3(N)
Prior to Test	44	2.8	20	120	29	5.8	7.9	250	17	BRL[3]	0.36	BRL[3]	16
After 1 Hour of Pumping	UR[4]	3.3	19	120	34	UR[4]	8.0	260	18	BRL	BRL[3]	BRL	19
After 24 Hours of Pumping	39	3.2	19	120	32	5.8	8.0	260	15	BRL	BRL	BRL	16
At End of Test (96 Hours)	46	2.9	19	130	38	5.9	8.0	250	19	BRL	BRL	BRL	19
Mean	43	3.1	19	120	33	5.8	8.0	260	17	BRL	BRL	BRL	18

Notes: (1) This table was developed using data from GSI/water as presented in Appendix GG of this report.
(2) Data are in milligrams per liter (mg/ℓ).
(3) BRL - Below reporting limits. Reporting limits for manganese, iron, and carbonate are 0.10, 0.20, and 10 mg/ℓ, respectively.
(4) UR - Under Review. This data is currently being reviewed by the chemical laboratory.

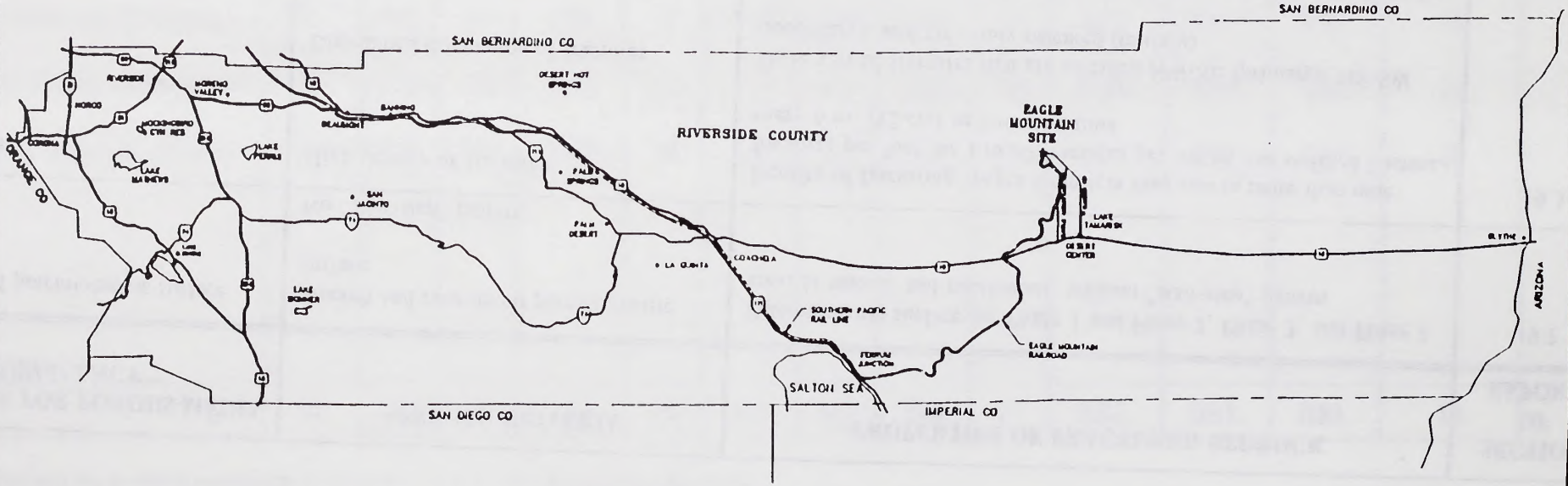
TABLE 6

COMPARISON OF EPA POROUS MEDIA EQUIVALENCY CRITERIA[1] WITH PROPERTIES OF EAGLE MOUNTAIN BEDROCK AQUIFER EAGLE MOUNTAIN LANDFILL

ASSUMPTIONS FOR POROUS-MEDIA EQUIVALENCY	SPECIFIC CRITERIA	PROPERTIES OF FRACTURED BEDROCK	SECTION OF REPORT[2]
Configuration of potentiometric surface	Smooth and continuous potentiometric surface No "stair-step" pattern	Potentiometric surface for Phase 1 and Phase 2, Phase 3, and Phase 4 areas is smooth and continuous, without "stair-step" pattern	19.2
Fracture pattern	High density of fractures Distributed orientation of fractures Relatively constant effective fracture aperture width Scale of fracturing small relative to scale of study area (at least 1:100)	Density of fracturing ranges from less than two to more than nine fractures per foot, or 7 to 30 fractures per meter; one unfilled fracture every 6 in. (15 cm) in saturated zone Three sets of fractures that are oriented NW-SE (primary), NE-SW (secondary), and randomly oriented (tertiary) Effective fracture aperture width ranges between 0.005 to 0.11 cm for the primary and secondary sets Ratio of scale of open fracturing to scale of study area is greater than 1:1,000	19.3
Distribution of hydraulic conductivity	Approximate log-normal distribution of permeability	Hydraulic conductivity calculated from effective aperture widths and packer tests follow log-normal distribution	19.4
Behavior in response to pump tests	Linear change in drawdown with change in pumping rate Approximately circular or elliptical cone of drawdown	Discharge-drawdown relationship is linear over full range of pumping Observed cone of drawdown from step- and constant-discharge pump tests is elliptical	19.5
Variations in ground-water chemistry	No significant variations in space or over time	Stiff diagrams and summary of statistics show that ground-water chemistry does not vary significantly over time and from place to place	19.6

Note: (1) Criteria from EPA [1991a,b].
(2) SECTION OF REPORT REFERS TO ROWD-SV2

SITE VICINITY MAP



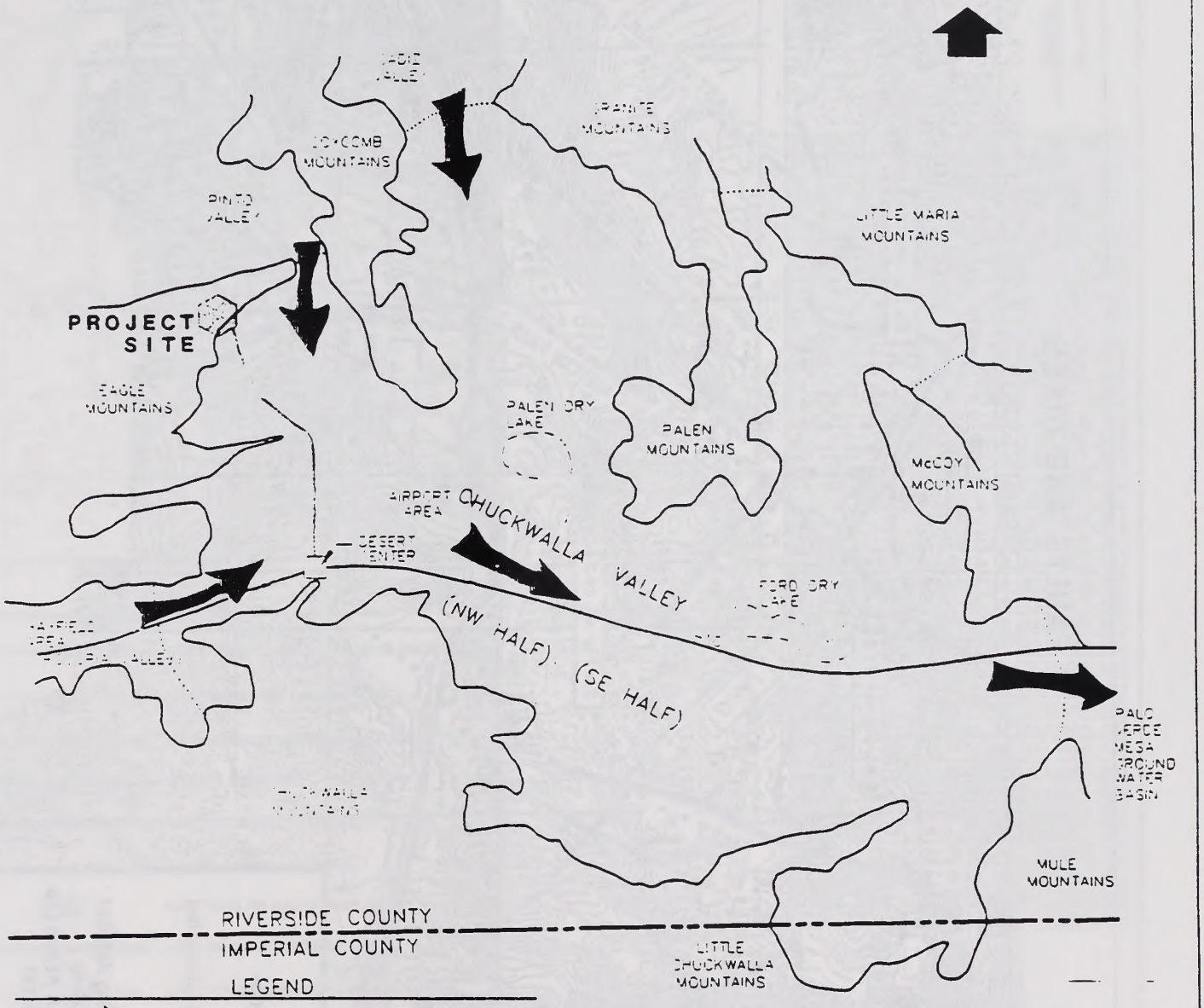
APPROXIMATE SCALE
0 20
(IN MILES)

SOURCE: GEOSYNTEC, 1992.

GeoSyntec Consultants
HUNTINGTON BEACH, CALIFORNIA

FIGURE NO.	1
PROJECT NO.	GE3586-18
DOCUMENT NO.	GA950904
FILE NO.	DF

PHYSIOGRAPHIC SETTING AND REGIONAL DIRECTION OF GROUND-WATER FLOW

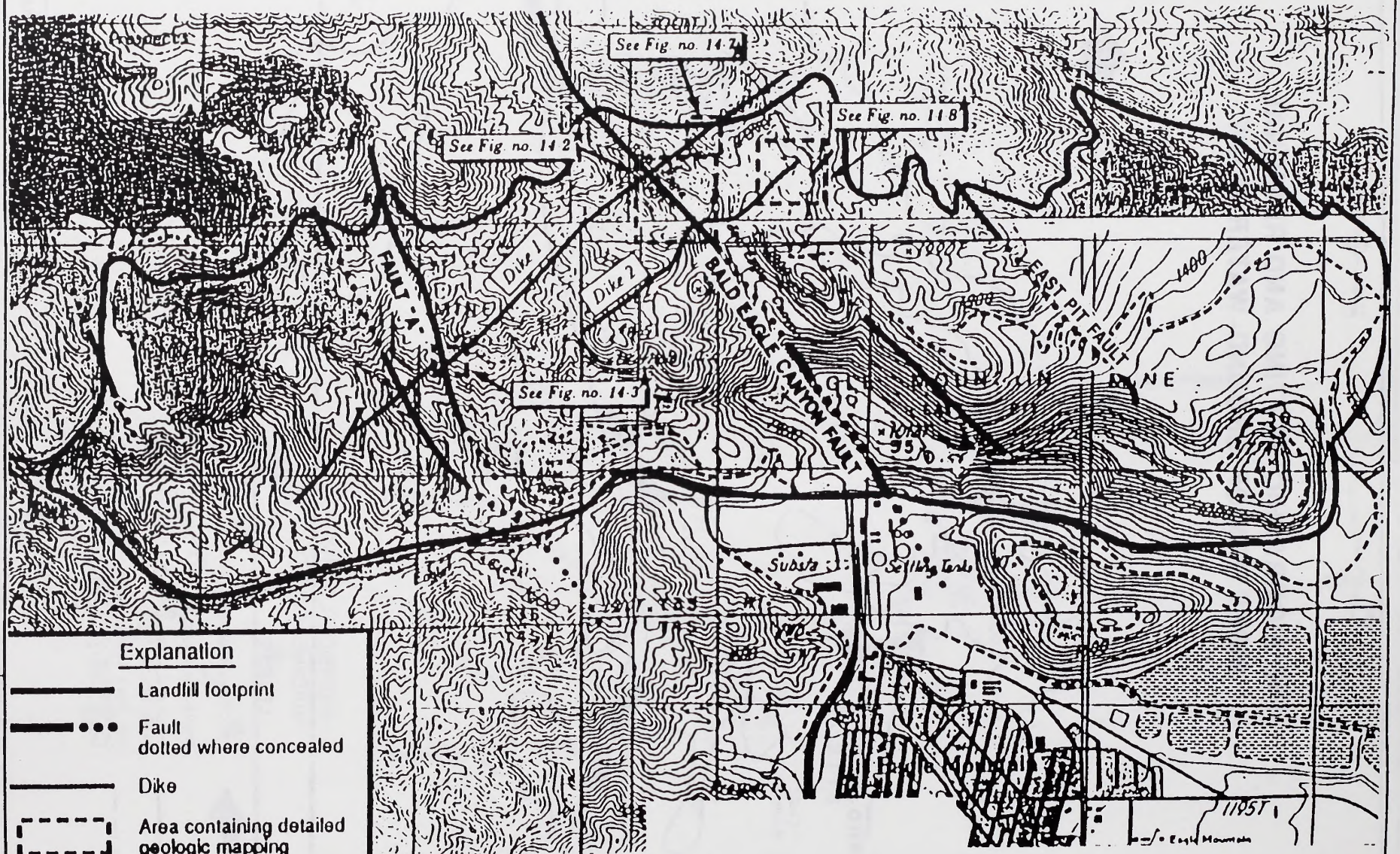


SOURCE: DWR (1975); GEOSYNTEC 1990

GeoSyntec Consultants
HUNTINGTON BEACH, CALIFORNIA

FIGURE NO.	2
PROJECT NO.	GE3586-18
DOCUMENT NO.	GA950904
FILE NO.	3586-012

FAULTS AND DIKES



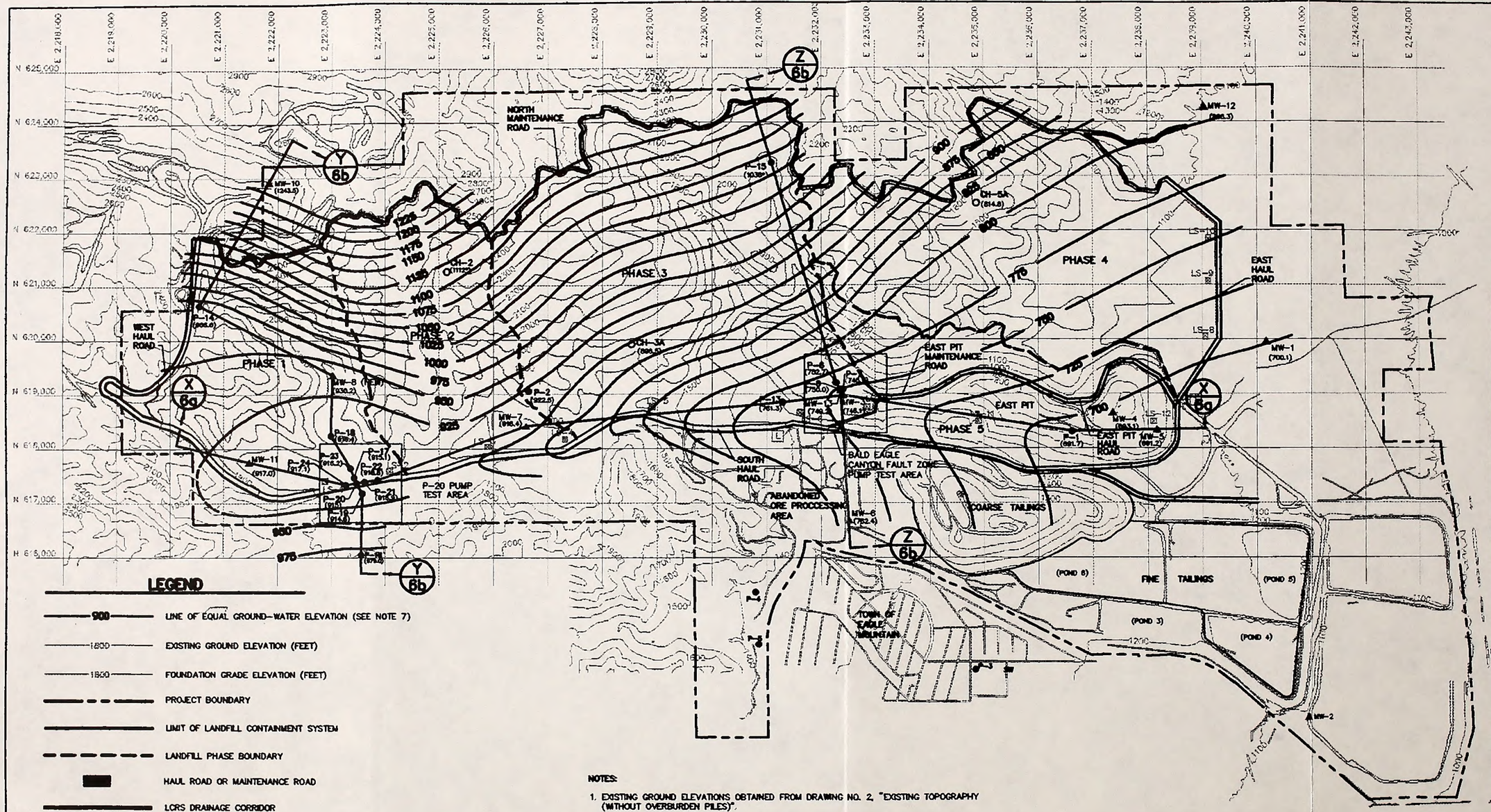
SOURCE: ROWD-SVI GEOSYNTEC, 1993a]

Base map from U.S.G.S. 7 1/2' Buzzard Spring, and Victory Pass Quadrangles

GeoSyntec Consultants
HUNTINGTON BEACH, CALIFORNIA

FIGURE NO.	4
PROJECT NO.	GE3586-18
DOCUMENT NO.	GA950904
FILE NO.	DF

327693



DESCRIPTION	NORTHING	EASTING
CH-2	621263.17	2225143.91
CH-3A	619921.91	2226530.79
CH-5A	622500.71	2234666.36
KMW	614090.26	2244667.13
MW-1	619959.37	2240189.01
MW-2	613061.48	2240940.26
MW-3	618977.39	2232404.20
MW-4	616642.25	2237376.45
MW-5	618340.71	2236180.12
MW-6	616698.05	2232508.17
MW-7	618416.69	2226597.46
MW-8(NEW)	619359.68	2223019.00
MW-10	622925.26	2221819.48
MW-11	617755.19	2221467.63
MW-12	624274.96	2239034.93
MW-13	619069.20	2232350.31
P-1	616311.22	2236615.26
P-2	619059.91	2226647.01
P-3	613956.93	2234838.70
P-4	615377.15	2230793.68
P-5	614425.36	2230649.39
P-6	619199.92	2232275.69
P-7	619091.98	2232393.87
P-8	619090.92	2232337.93
P-13	618851.60	2231265.44
P-14	620648.07	2220536.40
P-15	623257.49	2231061.19
P-16	616055.07	2223559.13
P-17	617473.96	2223423.49
P-18	618244.87	2222985.60
P-19	617164.42	2223574.88
P-20	617372.73	2223466.56
P-21	617396.43	2223617.21
P-22	617431.49	2223863.41
P-23	617645.62	2223356.57
P-24	617336.90	2223272.37
SW	613952.76	2235295.31

LEGEND

- 900 — LINE OF EQUAL GROUND-WATER ELEVATION (SEE NOTE 7)
- 1800 — EXISTING GROUND ELEVATION (FEET)
- 1850 — FOUNDATION GRADE ELEVATION (FEET)
- PROJECT BOUNDARY
- LIMIT OF LANDFILL CONTAINMENT SYSTEM
- LANDFILL PHASE BOUNDARY
- HAUL ROAD OR MAINTENANCE ROAD
- LCRS DRAINAGE CORRIDOR
- LCRS TRANSMISSION PIPELINE AND MANHOLE
- X 6a — LINE OF HYDROGEOLOGIC CROSS SECTION
- LCRS SUMP, SIDE SLOPE RISER, AND MANHOLE
- L — LEACHATE STORAGE TANK AREA
- P-2 (922.5) — PIEZOMETER LOCATION AND GROUND-WATER ELEVATION
- MW-7 (916.4) — MONITORING WELL LOCATION AND GROUND-WATER ELEVATION
- CH-2 (1112') — COREHOLE LOCATION AND GROUND-WATER ELEVATION
- SW — MISCELLANEOUS WELL LOCATION

NOTES:

1. EXISTING GROUND ELEVATIONS OBTAINED FROM DRAWING NO. 2, "EXISTING TOPOGRAPHY (WITHOUT OVERBURDEN PILES)".
2. FOUNDATION GRADE ELEVATIONS OBTAINED FROM DRAWING NO. 4, "FOUNDATION GRADING PLAN".
3. ELEVATIONS ARE IN FEET ABOVE SEA LEVEL, NATIONAL GEODETIC VERTICAL DATUM OF 1929.
4. LIMIT OF LANDFILL CONTAINMENT SYSTEM SHOWN ON THIS DRAWING DEFINES THE WASTE MANAGEMENT UNIT BOUNDARY.
5. LOCAL GRID COORDINATE SYSTEM ESTABLISHED BY C.M. ENGINEERING ASSOCIATES, SAN BERNARDINO, CALIFORNIA.
6. THE LOCATION OF ANY CONTOUR ON THIS DRAWING IS ACCURATE TO WITHIN ± 50 FEET HORIZONTALLY.
7. GROUND-WATER LEVELS WERE MEASURED ON 16 AUGUST 1993 UNLESS OTHERWISE INDICATED IN FOLLOWING NOTES. GROUND-WATER LINES OF EQUAL ELEVATION PROVIDED BY GSI/water, SOUTH PASADENA, CALIFORNIA.
8. GROUND-WATER LEVELS FOR THE P-20 PUMP TEST AREA WERE MEASURED ON 5 OR 10 NOVEMBER 1993.
9. GROUND-WATER LEVEL SHOWN FOR CH-2 WAS EXTRAPOLATED BY GSI/water, BASED ON THE TREND OF PREVIOUS DATA IN CH-2, AS CONFIRMED BY SIMILAR TRENDS IN GROUND-WATER LEVELS IN P-14 AND MW-8.
10. GROUND-WATER LEVEL SHOWN FOR P-15 WAS EXTRAPOLATED BY GSI/water, BASED ON THE TREND OF PREVIOUS DATA FROM P-15, AS CONFIRMED BY SIMILAR TRENDS IN GROUND-WATER LEVELS IN CH-5A.

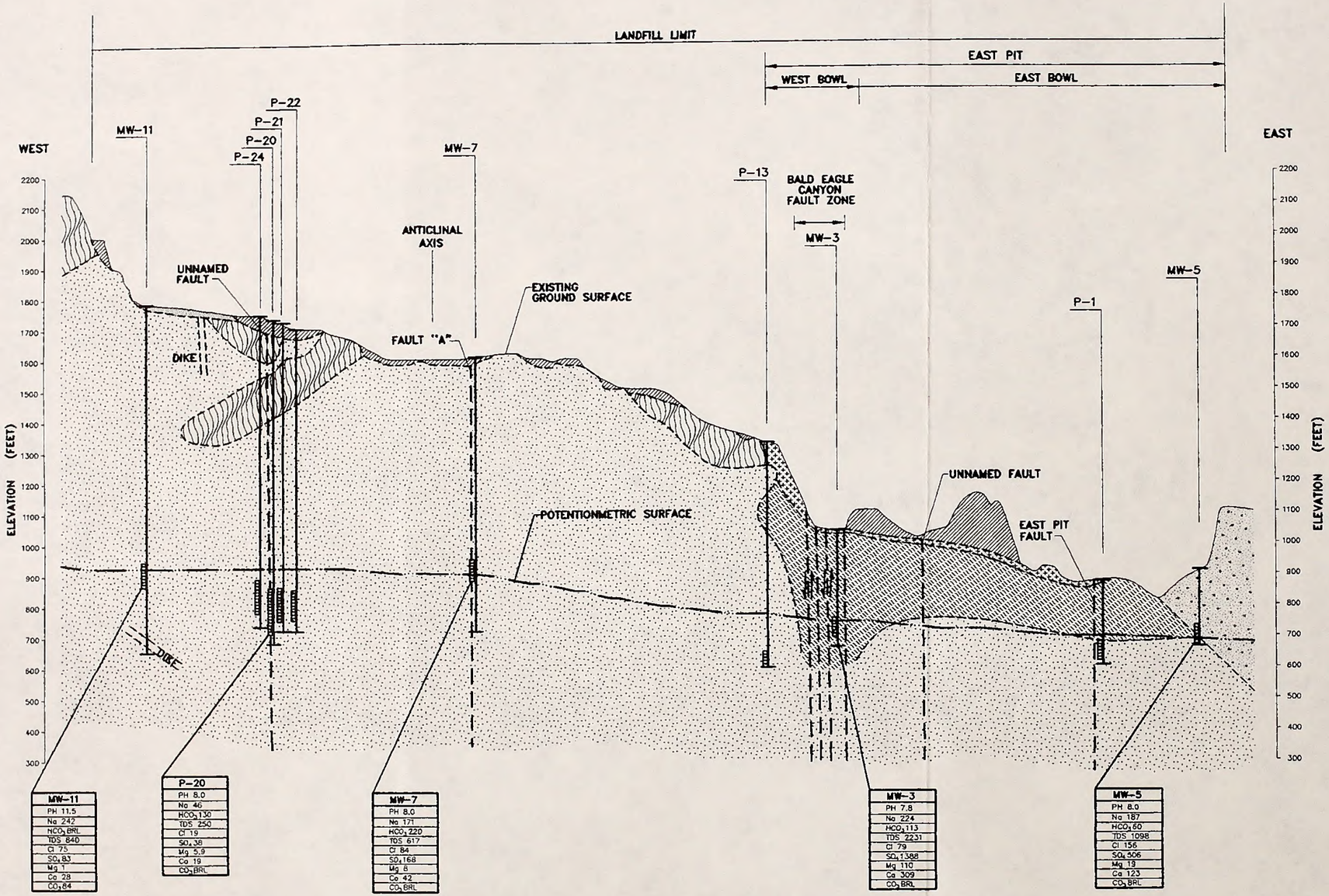
POTENTIOMETRIC SURFACE OF SATURATED BEDROCK AND LINES OF HYDROGEOLOGIC CROSS SECTIONS

2000 1000 0 1000 2000
SCALE IN FEET

GeoSyntec Consultants
ATLANTA, GA

PROJECT NO. GE3586-18	FIGURE NO. 5
DOCUMENT NO. GA950904	FILE NO. 3586F003

HYDROGEOLOGIC CROSS SECTION X–X



SECTION X–X

HORIZONTAL SCALE: 1" = 2000'
VERTICAL SCALE: 1" = 400'

LEGEND

- ARTIFICIAL FILL
- CANYON FLOOR QUATERNARY ALLUVIUM
- CHUCKWALLA VALLEY ALLUVIUM (INCLUDES DEBRIS FLOWS)
- IRON ORE
- HYDROTHERMALLY ALTERED METASEDIMENTARY ROCK AND SOME ALTERED IGNEOUS ROCK
- GRANITIC INTRUSIVE ROCK (PREDOMINANTLY QUARTZ MONZONITE)
- METASEDIMENTARY ROCK (PREDOMINANTLY QUARTZITE)

NOTES:

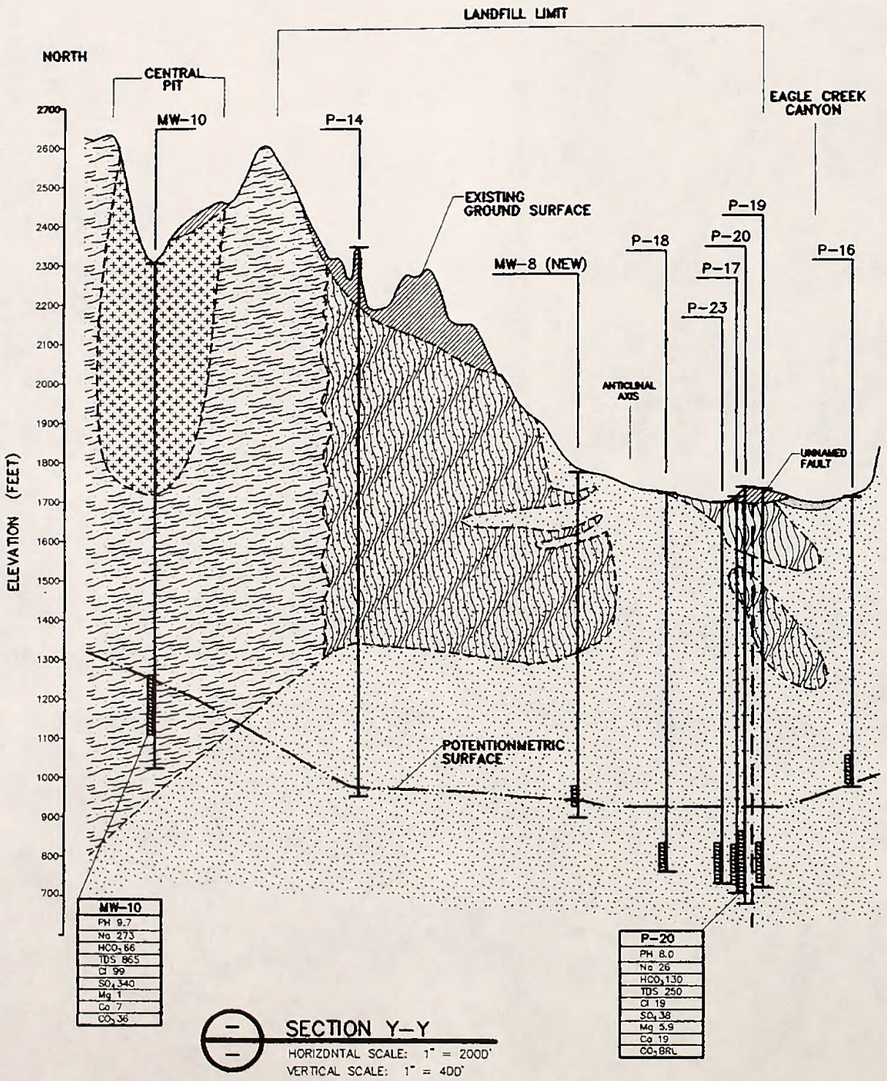
1. GEOLOGY IS BASED ON THE SURFACE GEOLOGIC MAP AND BORING LOGS PREPARED BY GSI/water [GEOSYNTEC, 1992, PLATES 1 & 2]. SUBSURFACE GEOLOGY BETWEEN CONTROL POINTS IS GENERALIZED.
2. POTENTIOMETRIC SURFACE IS DRAWN FROM FIGURE 5 AND MEASURED GROUND-WATER LEVEL ELEVATIONS IN THE INDICATED MONITORING WELLS AND PIEZOMETERS.
3. GROUND-WATER QUALITY DATA ARE MEAN VALUES IN MILLIGRAMS PER LITER (MG/L). BRL = BELOW REPORTING LIMIT.
4. SEE FIGURE 5 FOR LINE OF CROSS SECTION.

GeoSyntec Consultants
ATLANTA, GA

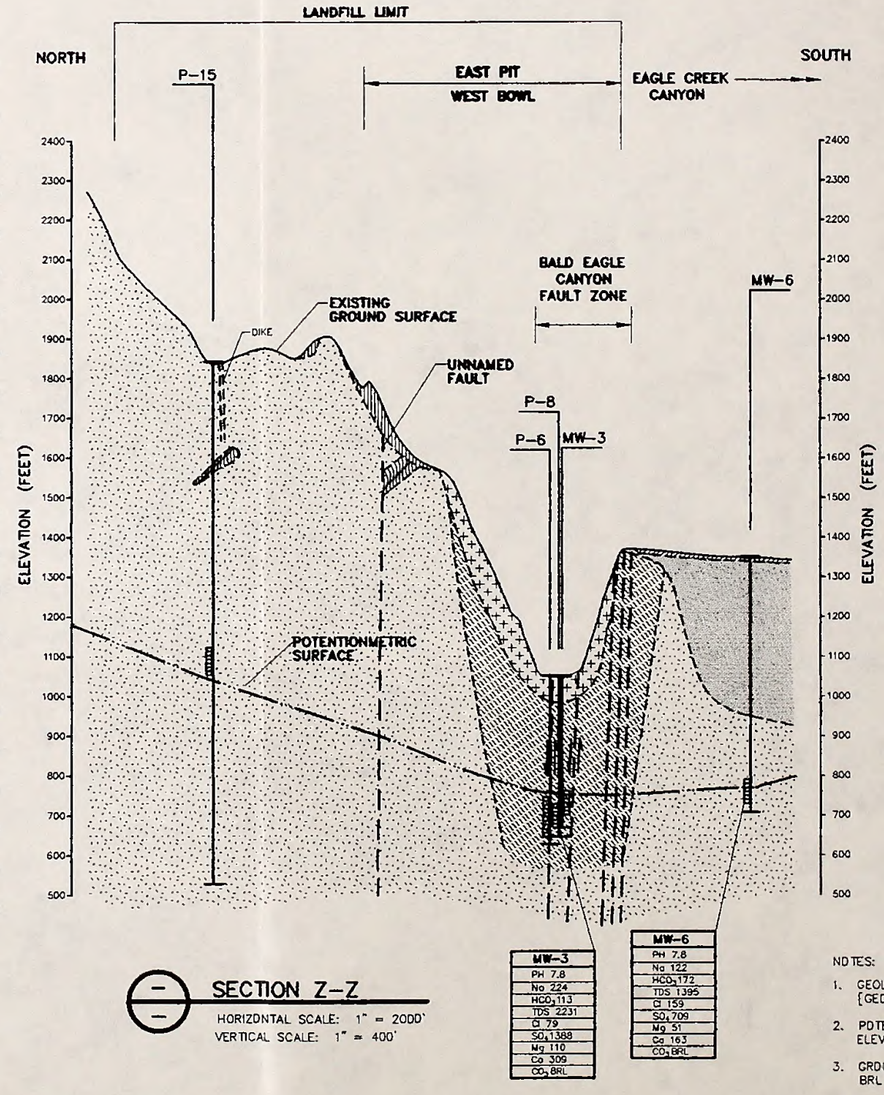
PROJECT NO. GE3586-18	FIGURE NO. 6a
DOCUMENT NO.	FILE NO. 3586F001



HYDROGEOLOGIC CROSS SECTIONS Y–Y AND Z–Z



SECTION Y–Y
HORIZONTAL SCALE: 1" = 200'
VERTICAL SCALE: 1" = 400'



SECTION Z–Z
HORIZONTAL SCALE: 1" = 200'
VERTICAL SCALE: 1" = 400'

LEGEND

- ARTIFICIAL FILL
- CANYON FLOOR QUATERNARY ALLUVIUM
- IRON ORE
- HYDROTHERMALLY ALTERED METASEDIMENTARY ROCK AND SOME ALTERED IGNEOUS ROCK
- METASEDIMENTARY ROCKS WITH NUMERQUS ANDESITE DIKES
- QUARTZITE THICKLY INTRUDED BY GRANITIC ROCK
- GRANITIC INTRUSIVE ROCK (PREDOMINANTLY QUARTZ MONZONITE)
- METASEDIMENTARY ROCK (PREDOMINANTLY QUARTZITE)

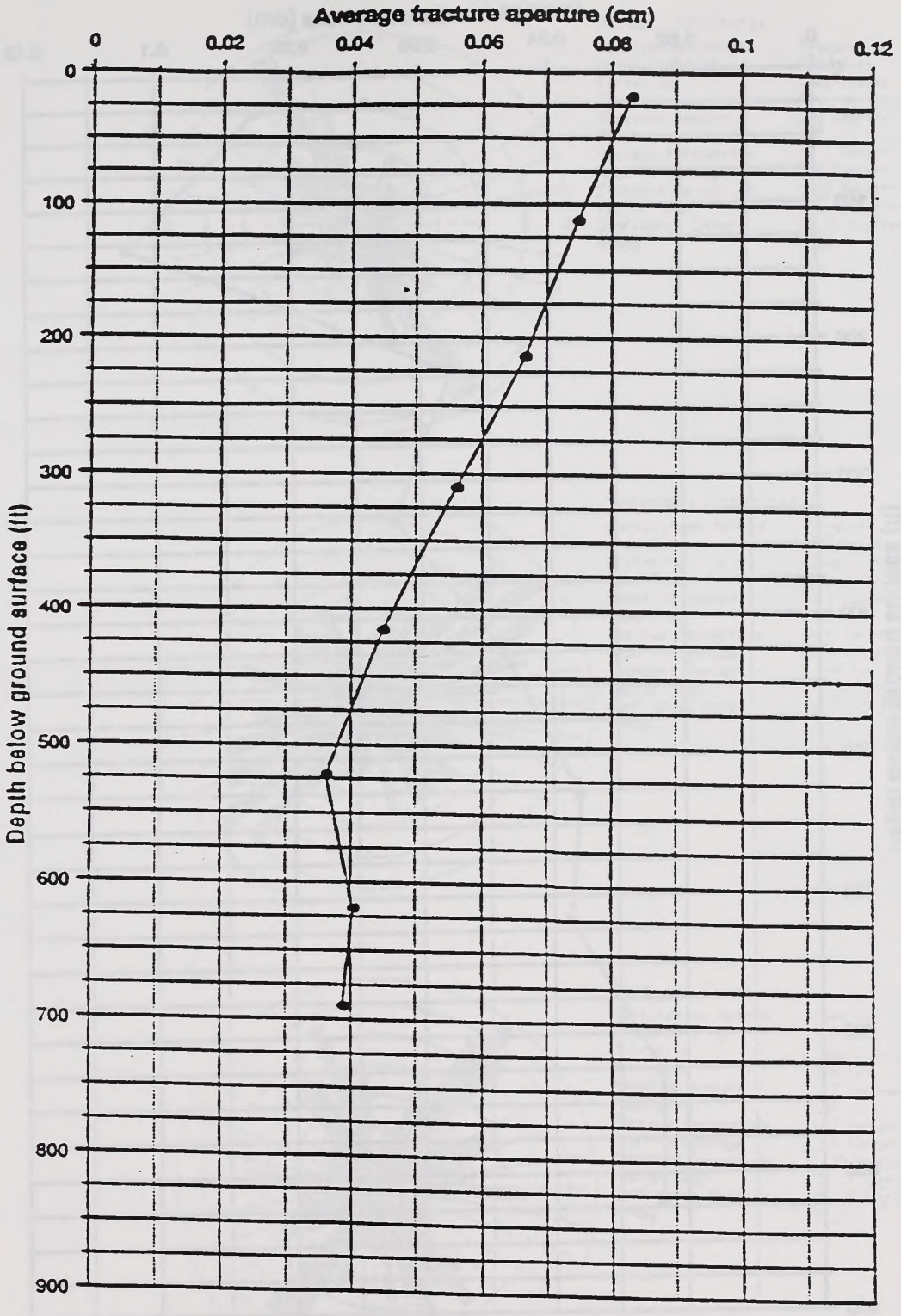
NOTES:

1. GEOLOGY IS BASED ON THE SURFACE GEOLOGIC MAP AND BORING LOGS PREPARED BY GSI/water [GEOSYNTEC, 1992, PLATES 1 & 2]. SUBSURFACE GEOLOGY BETWEEN CONTROL POINTS IS GENERALIZED.
2. POTENTIOMETRIC SURFACE IS DRAWN FROM FIGURE 5 AND MEASURED GROUND-WATER LEVEL ELEVATIONS IN THE INDICATED MONITORING WELLS AND PIEZOMETERS.
3. GROUND-WATER QUALITY DATA ARE MEAN VALUES IN MILLIGRAMS PER LITER (MG/L). BRL = BELOW REPORTING LIMIT.
4. SEE FIGURE 5 FOR LINE OF CROSS SECTION.

GeoSyntec Consultants
ATLANTA, GA

PROJECT NO. GE3586-18	FIGURE NO. 6b
DOCUMENT NO.	FILE NO. 3586F002





Note: Data from GSi/water,
South Pasadena, California

EAGLE MOUNTAIN

LANDFILL AND RECYCLING CENTER

RIVERSIDE COUNTY, CALIFORNIA

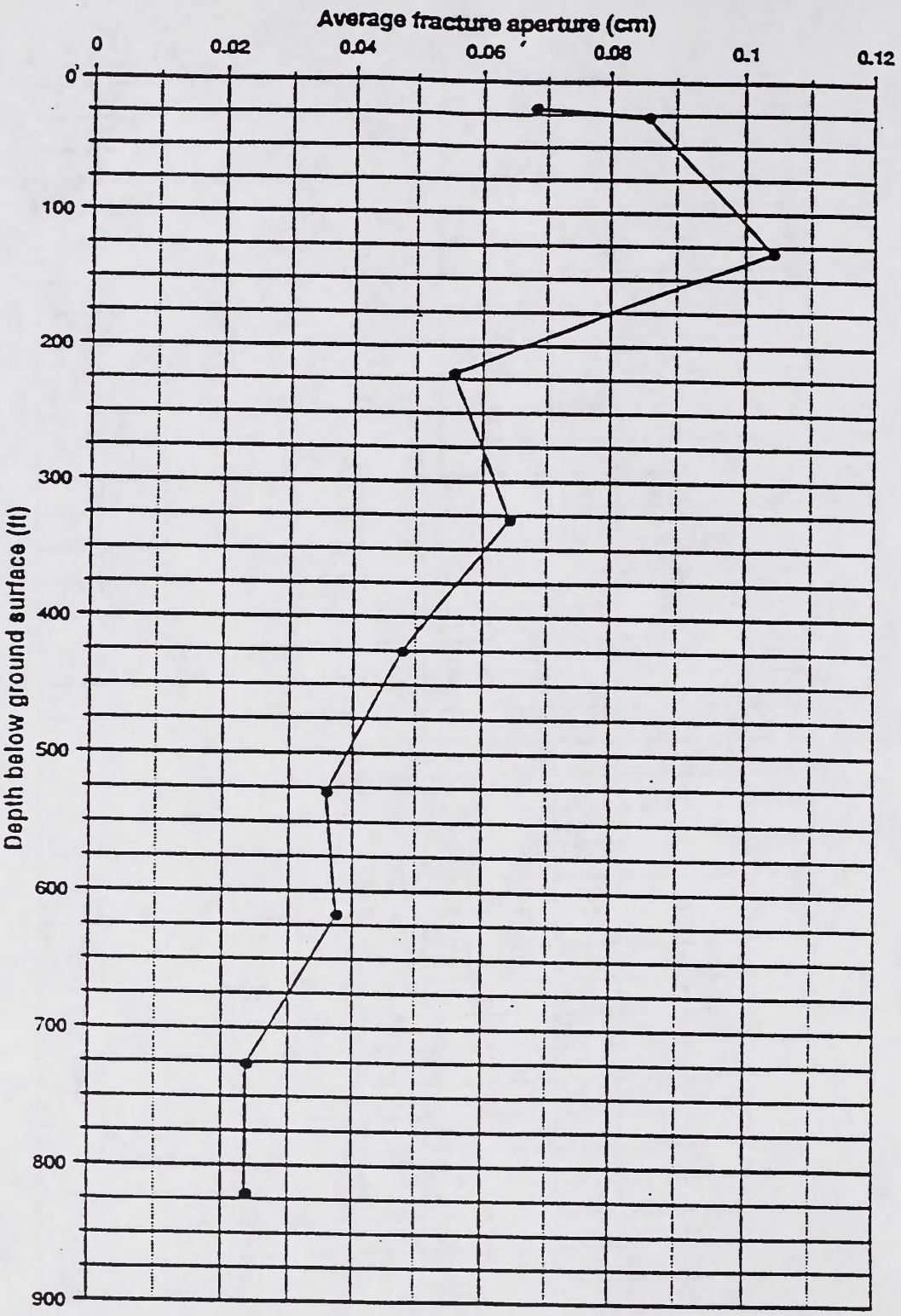
PREPARED FOR:

MINE RECLAMATION CORPORATION

AVERAGE APERTURE WIDTHS WITH DEPTH: MW-7

PROJECT NO.:	GE3586-18
DOCUMENT NO.:	GA950904
FIGURE NO.:	7a

DWG: 4C3CE101 199312151055 LP



Note: Data from GSi/water,
South Pasadena, California

EAGLE MOUNTAIN

LANDFILL AND RECYCLING CENTER

RIVERSIDE COUNTY, CALIFORNIA

PREPARED FOR:

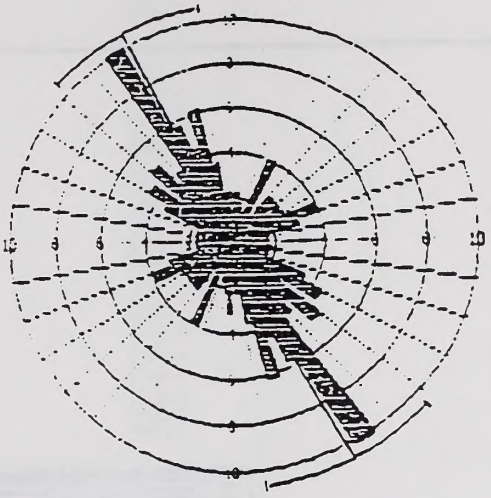
MINE RECLAMATION CORPORATION

AVERAGE APERTURE WIDTHS WITH DEPTH: MW-8

PROJECT NO.:	GE3586-18
DOCUMENT NO.:	GA950904
FIGURE NO.:	7b

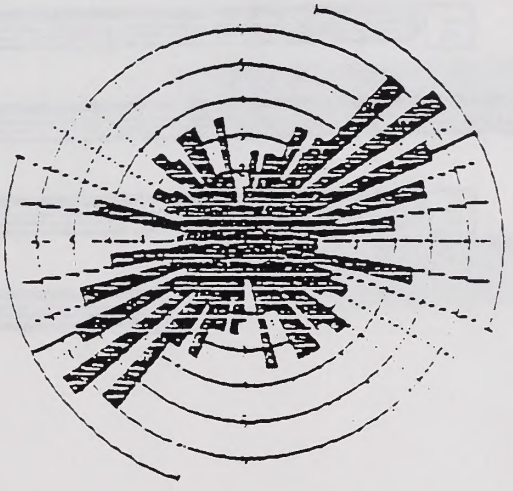
DWG: 4030E101 199312151055 LP

ROSE DIAGRAMS: PRIMARY, SECONDARY, AND TERTIARY FRACTURES



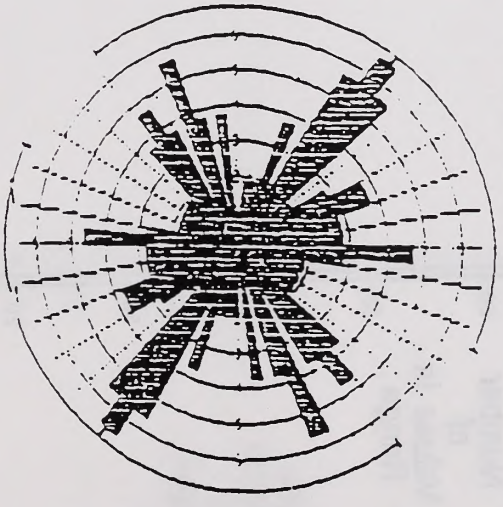
Primary Fractures

Calculation Method	Frequency
Class Interval	5 Degrees
Filtering	Geostatistics
Data Type	Bidirectional
Rotation Amount	0.0 Degrees
Population	227
Maximum Percentage	10.1 Percent
Mean Percentage	2.5 Percent
Standard Deviation	1.91 Percent
Vector Mean	331.72 Degrees
Confidence Interval	13.36 Degrees
R-mag	0.65



Secondary Fractures

Calculation Method	Frequency
Class Interval	5 Degrees
Filtering	Geostatistics
Data Type	Bidirectional
Rotation Amount	0.0 Degrees
Population	165
Maximum Percentage	9.7 Percent
Mean Percentage	2.5 Percent
Standard Deviation	1.66 Percent
Vector Mean	71.11 Degrees
Confidence Interval	15.10 Degrees
R-mag	0.46



Tertiary Fractures

Calculation Method	Frequency
Class Interval	5 Degrees
Filtering	Geostatistics
Data Type	Bidirectional
Rotation Amount	0.0 Degrees
Population	107
Maximum Percentage	9.3 Percent
Mean Percentage	2.5 Percent
Standard Deviation	1.90 Percent
Vector Mean	25.14 Degrees
Confidence Interval	18.10 Degrees
R-mag	0.10

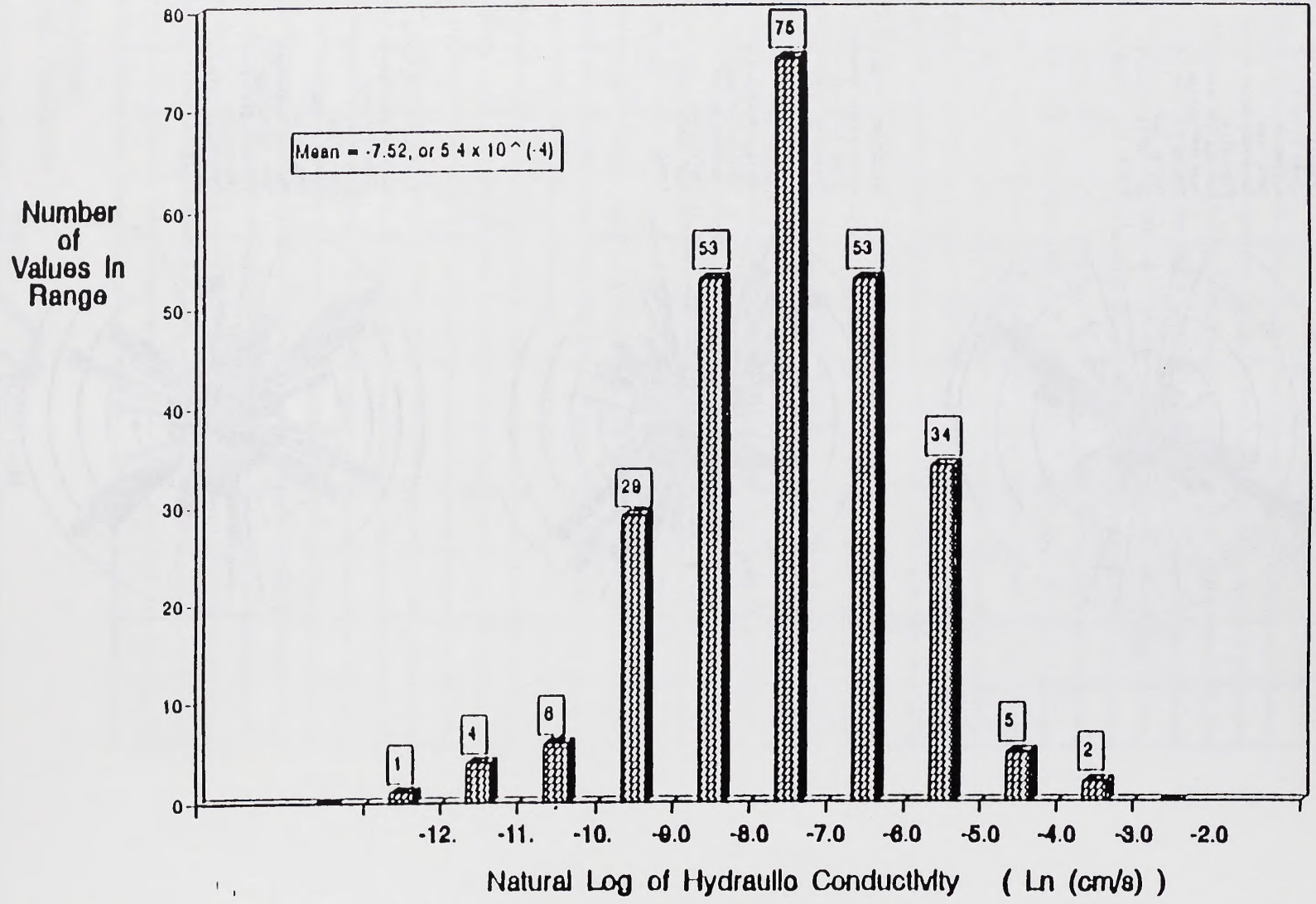
AFTER Gsi/water (GEOSYNTEC, 1992)

GeoSyntec Consultants
HUNTINGTON BEACH, CALIFORNIA

FIGURE NO.	8
PROJECT NO.	GE3586-18
DOCUMENT NO.	GA950904
FILE NO.	

327693

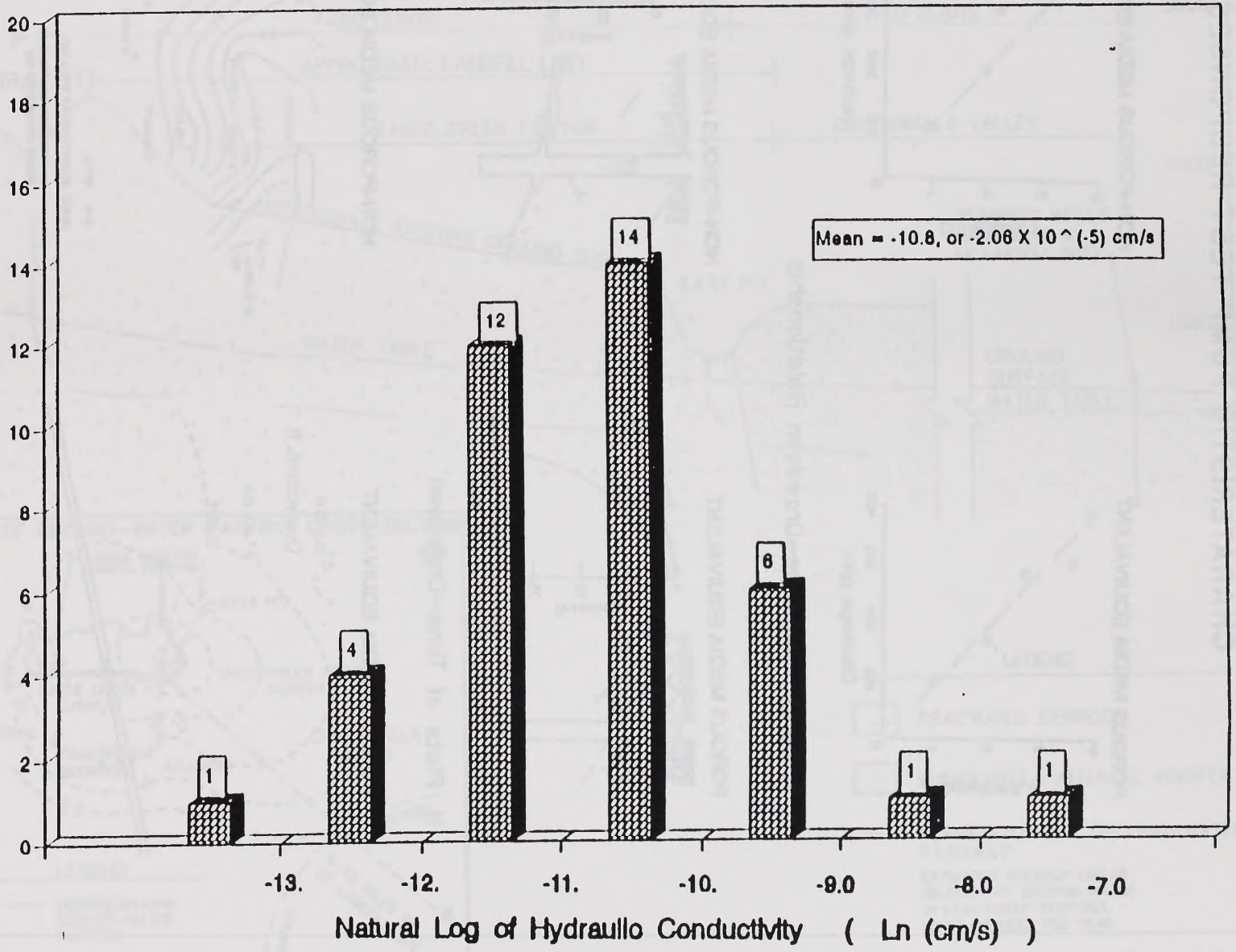
STATISTICAL DISTRIBUTION OF HYDRAULIC CONDUCTIVITIES CALCULATED FROM FRACTURE APERTURES



GeoSyntec Consultants
HUNTINGTON BEACH, CALIFORNIA

FIGURE NO.	9
PROJECT NO.	GE3586-18
DOCUMENT NO.	GA950904
FILE NO.	

STATISTICAL DISTRIBUTION OF HYDRAULIC CONDUCTIVITIES CALCULATED FROM PACKER TESTS



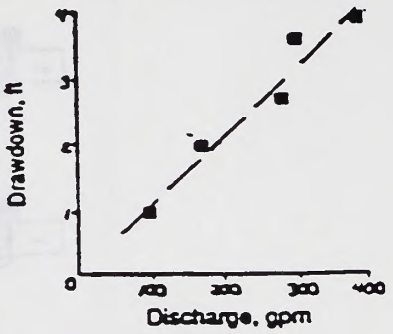
GeoSyntec Consultants
HUNTINGTON BEACH, CALIFORNIA

FIGURE NO.	10
PROJECT NO.	GE3586-18
DOCUMENT NO.	GA950904
FILE NO.	

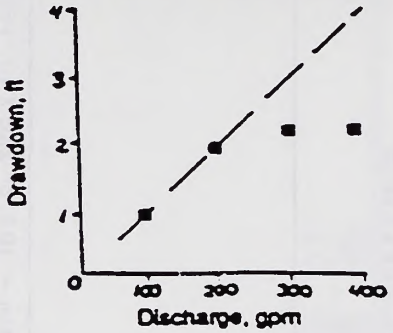
327693

CHARATERISTIC PUMP TEST RESPONSES

POROUS MEDIA EQUIVALENT

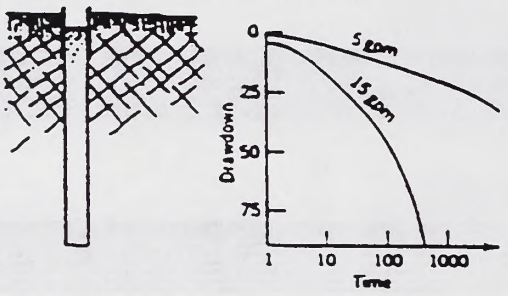


NON-POROUS MEDIA EQUIVALENT

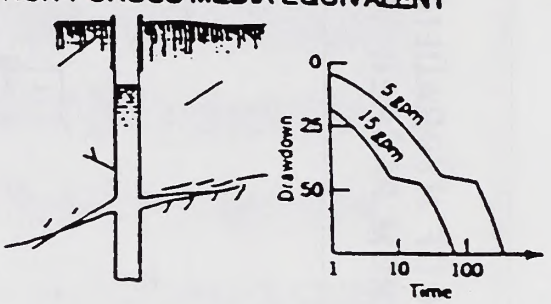


A. Plots of Discharge–Drawdown Relationship

POROUS MEDIA EQUIVALENT

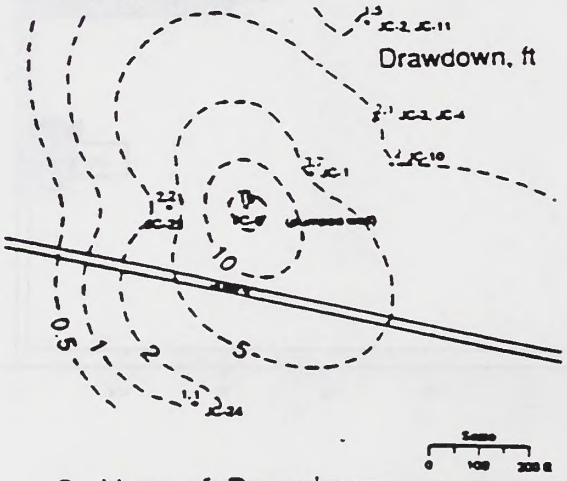


NON-POROUS MEDIA EQUIVALENT

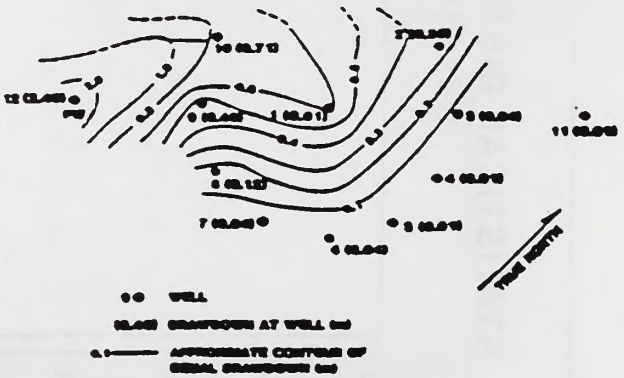


B. Plots of Time–Drawdown

POROUS MEDIA EQUIVALENT



NON-POROUS MEDIA EQUIVALENT



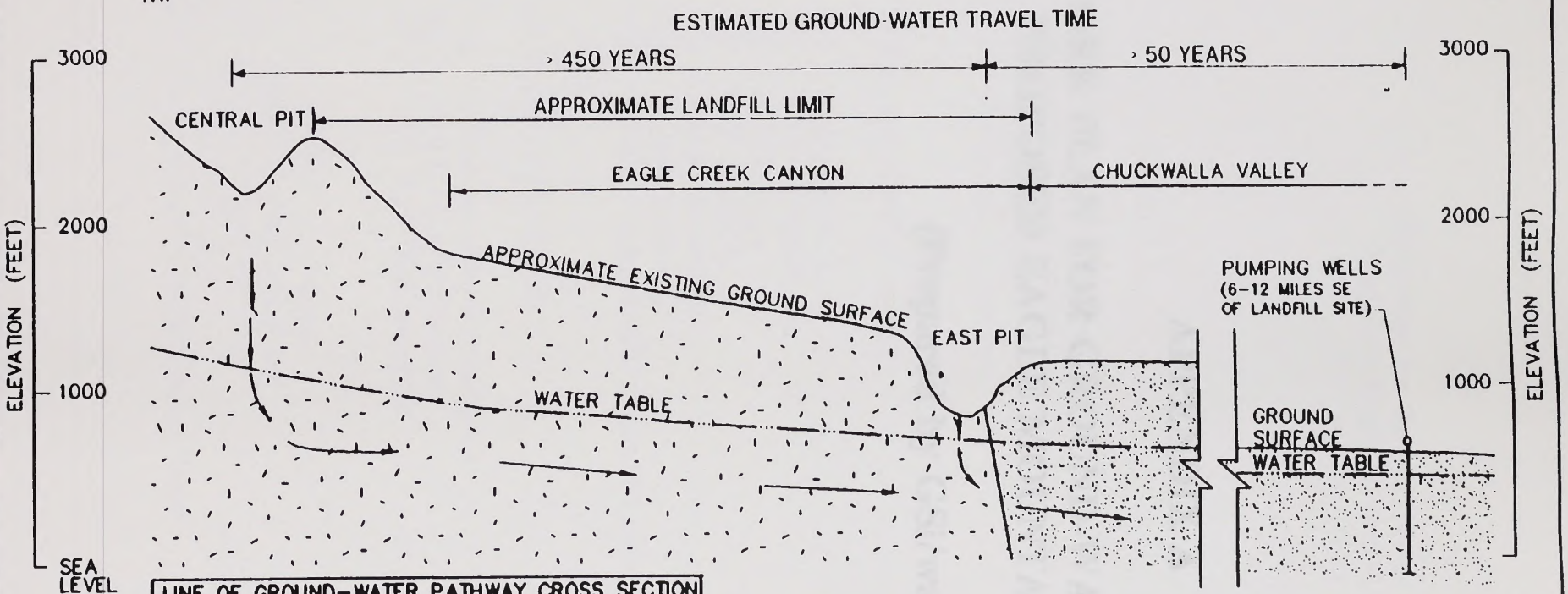
C. Map of Drawdown

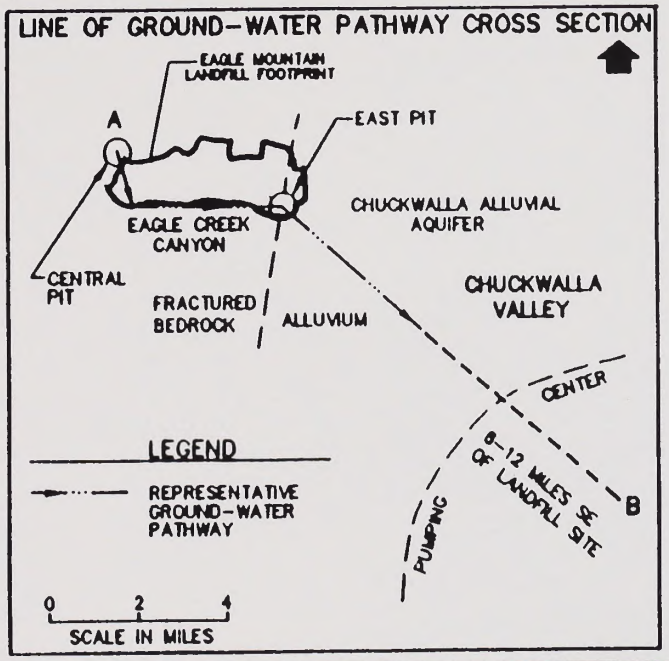
Notes: (1) Figure adapted from EPA [1991a]
(2) Discharge–drawdown plots in (A) from Hickey [1984]
(3) Time–drawdown plots in (B) from Davis and DeWiest [1966]

GeoSyntec Consultants
HUNTINGTON BEACH, CALIFORNIA

FIGURE NO.	11
PROJECT NO.	GE3586-18
DOCUMENT NO.	GA950904
FILE NO.	

REPRESENTATIVE GROUND-WATER PATHWAY CROSS SECTION





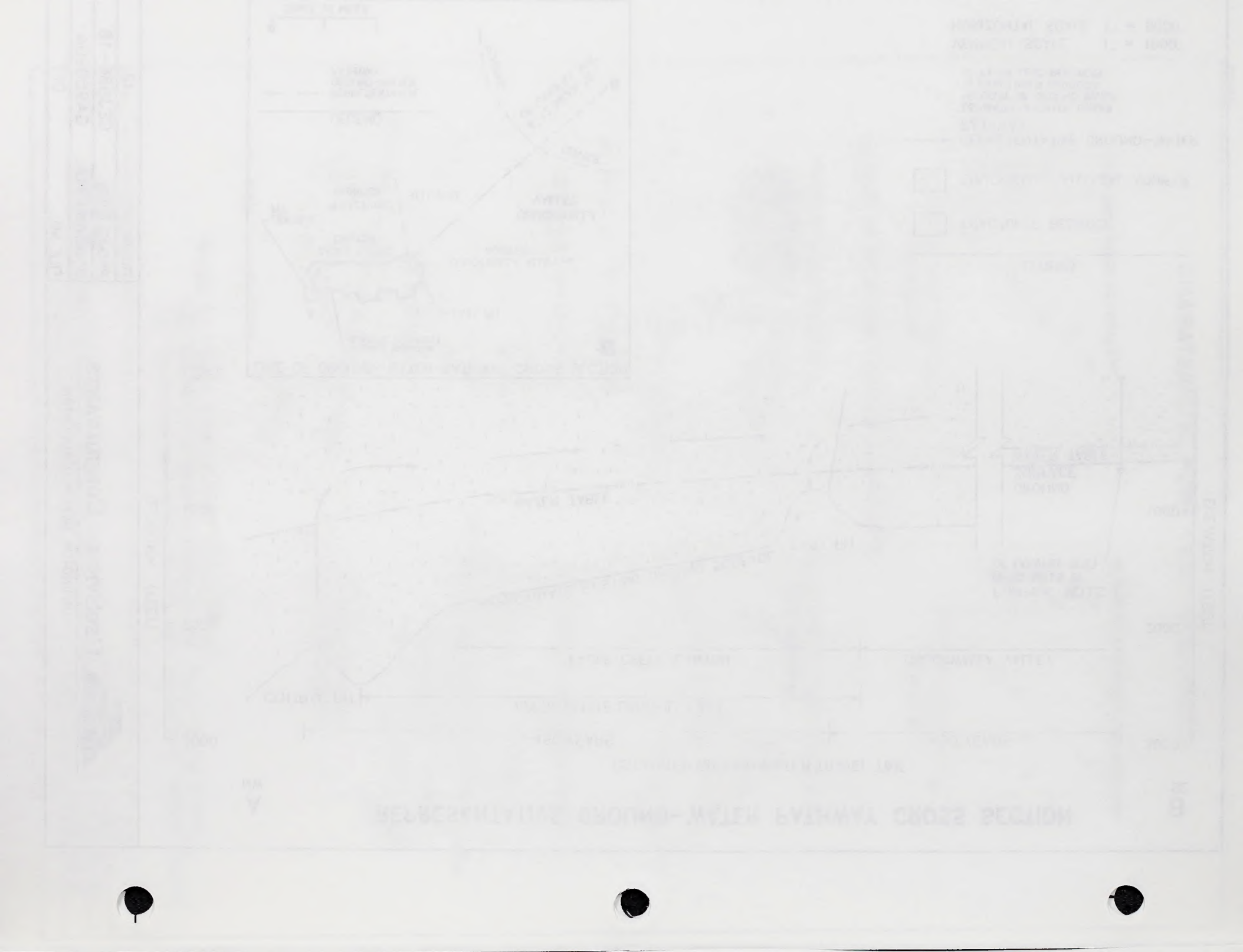
LEGEND

- FRACTURED BEDROCK
- CHUCKWALLA ALLUVIAL AQUIFER
- REPRESENTATIVE GROUND-WATER PATHWAY
  ESTIMATED AVERAGE LINEAR VELOCITY OF GROUND WATER IN FRACTURED BEDROCK 10 FT OR LESS PER YEAR.

VERTICAL SCALE: 1" = 1000'
HORIZONTAL SCALE: 1" = 5000'

GeoSyntec Consultants
HUNTINGTON BEACH, CALIFORNIA

FIGURE NO.	12
PROJECT NO.	GE3586-18
DOCUMENT NO.	GA950904
FILE NO.	DF



APPENDIX A

WORK PLAN FOR GROUND-WATER SAMPLING PROPOSED EAGLE MOUNTAIN LANDFILL

(Prepared by GSi/water)

Work Plan for Ground Water Sampling
Proposed Eagle Mountain Landfill
11 February 1993

CONTENTS

DRAFT

1.0 INTRODUCTION

- 1.1 Purpose and Scope
- 1.2 Regulatory Compliance
- 1.3 Monitoring Sites
- 1.4 Parameters of Analysis

2.0 SAMPLING PROCEDURES

- 2.1 Field Log Book
- 2.2 Well Measurements
- 2.3 Well Purging
- 2.4 Well Sampling
- 2.5 Sample Collection
- 2.6 Sample Labeling
- 2.7 Sample Transport and Chain of Custody

3.0 QUALITY ASSURANCE

- 3.1 Field Preventive Maintenance
- 3.2 Quality Control Samples
- 3.3 Laboratory Requirements

Table 1 - Parameters of Analysis
Figure 1 - Monitoring Well Locations
Example - Chain-of-Custody Form
Example - Sampling Record
Example - Sampling and Quality Control Form

References

1.0 INTRODUCTION

DRAFT

1.1 Purpose and Scope

The purpose of this work plan is to provide a program of sampling and analysis in the existing monitoring wells located in the proposed Eagle Mountain Landfill. The procedures detailed in this report are based on Section 11, Water Quality Monitoring Programs, Report of Waste Discharge, Eagle Mountain Landfill and Recycling Center (ROWD), Geosyntec Consultants, December 1992.

This plan details the procedures and techniques for sample collection, sample preservation and shipment, analytical procedures and quality control measures to ensure that monitoring results provide a reliable indication of water quality.

1.2 Regulatory Compliance

These ground water sampling procedures are to be used to comply with the requirements of Title 23, Article 5 of Chapter 15, California Code of Regulations and 40 CFR Section 258 of the Code of Federal Regulations.

1.3 Monitoring Sites

Ground water sampling will be performed at the existing monitoring wells in the proposed Eagle Mountain Landfill project area. The following is a list of the monitoring wells to be sampled:

MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
MW-7
MW-8
MW-10
MW-11
MW-12
MW-13
SW (School Well)

The specific well locations are shown on Figure 1 of this report.

1.4 Parameters of Analysis

Sampling and analysis of the monitoring wells will be conducted for the parameters listed in Table 1 of this report (Browning-Ferris Industries, personal comm., 1992). These parameters include those listed in the ROWD which are proposed as the constituents of concern for the ground water monitoring program (ROWD, Sec. 11.7, pp. 11-55 & 11-56). The EPA methods of analysis for these parameters are also listed in Table 1 and will conform with the Test Methods for Evaluating Solid Waste - Physical /Chemical Methods, EPA SW-846, 3rd Edition, 1986, revised 1987.

2.0 SAMPLING PROCEDURES

2.1 Field Log Book

A field log book shall be maintained with an up-to-date record of information, when applicable, to the specific monitoring location (USEPA, 1986, Sec 4.4.3, p.116. The field log book serves primarily as a daily log of the activities carried out during the sampling. The field book will be hard bound with pre-numbered pages. All entries will be made with indelible ink. It will include the following:

- Sampling location description.
- Well depth.
- Static water level.
- Purge volume and pumping rate.
- Time well was purged.
- Well evacuation procedure/equipment.
- Sample withdrawal procedure/equipment.
- Date and time of collection.
- Well sampling sequence.
- Types of sample containers used and sample identification numbers.
- Preservatives used.
- Amount of sample collected.
- Analyses requested.
- Field observations on sampling event.
- Name of collector.
- Climatic conditions including air temperature.
- Internal temperature of field and shipping containers.
- QA/QC procedures followed at the site (Blanks, Duplicates, Calibration, etc).
- Field measurements such as temperature, pH and conductivity.

DRAFT

2.2 Well Measurements

All sampling activities will be conducted on a polyethylene sheet to be laid around the well. The static water level and total depth of the well will be measured to the nearest 1/100 ft from the top of casing (TOC) (USEPA, 1986, Sec. 4.2.1, p. 99). The distance from the ground level to TOC will also be measured to the nearest 1/100 ft. The water level measuring instruments will be field-tested using distilled water prior to use in each well. The volume of water in the well casing will be determined using the static water level and the total depth of the well measured. All measurements will be recorded in the field notebook.

The water level measurement instruments will be decontaminated before and after each use (USEPA, 1986, Sec 4.2.3, p.104). The following procedures will be followed as a minimum for decontamination:

- Remove visible contamination by wiping with an absorbent cloth.
- Wash with laboratory, non-phosphate detergent and a soft bristle brush.
- Rinse and flush with deionized water.
- Visually inspect the equipment to verify effective decontamination.
- Repeat steps if residual contamination is detected.

2.3 Well Purging

Three to five well volumes of ground water will be purged from the well before samples will be collected. Evacuation will be accomplished using a dedicated teflon bailer. Dedicated bladder pumps and/or submersible stainless steel pumps are considered as alternative evacuation methods. Non-dedicated bladder pumps and/or submersible stainless steel pumps are acceptable, provided that it is decontaminated before use and between wells as described below. Purge water will be discharged onto the ground away from the well head.

In the event that the well is pumped dry, an alternative procedure will be followed. The well will be pumped dry, allowed to recover to 80 percent or more of the original water level, and subsequently sampled. If recovery exceeds two hours, the sample will be collected as soon as sufficient volume is available (USEPA, 1986, Sec. 4.2.3, p. 103).

Non-dedicated purging pump will be decontaminated before use and between each well (USEPA, 1986, Sec 4.2.3, p.104). The following procedures will be followed as a minimum for decontamination:

- Remove visible contamination by wiping with an absorbent cloth.
- Wash with laboratory, non-phosphate detergent and a soft bristle brush.
- Rinse and flush with deionized water and by steam cleaning.
- Visually inspect the equipment to verify effective decontamination.

DRAFT

- Repeat steps if residual contamination is detected.

The riser discharge pipe used in the purging will be steam cleaned as part of the decontamination.

Immediately after sampling, each well will be, to the extent practical, purged of a volume of water equal to the pre-sampling purge volume (California Code of Regulations, Title 23, Chapter 15, Article 5, Sec. 2550.7(e)(12)(B)). However, it is anticipated that in many of the monitoring wells, draw down due to purging will be large and the well will be pumped dry. The anticipated slow recovery could make it impractical to purge a well after sampling in like volume to the purge volume before sampling (ROWD, Sec. 11.6.4.2, p. 11-53).

At a minimum, electrical conductance, pH and temperature measurements will be taken after each well volume is purged. Purging will continue until successive measurements of the conductance, pH and temperature stabilize.

Prior to each round of sampling, all instruments will be calibrated pursuant to manufacturers' instruments using calibration solutions maintained at approximately ambient ground water temperature.

At a minimum during sampling, a calibration check will be performed at the beginning, middle and end of each day, using calibration solutions at ambient field temperature. Calibration standards will span the range of field values that will be encountered. All supplies for calibration and to maintain the instruments in working order will be on-site and available for use.

The equipment used for field measurements will be thoroughly rinsed with deionized water between measurements.

Pumping rate, pumping time, and field water quality measurements, including the time measurements are made during pumping, will be recorded in the field notebook.

2.4 Well Sampling

Water samples will be collected immediately following well purging, or as soon as recharge provides sufficient volume of water for sampling. Clean gloves will be worn by the sampling personnel. Samples will be collected using a teflon bailer. The bailer will be lowered into the well with an inert cable (i.e. fluorocarbon resin-coated or stainless steel wire). Tests for electrical conductance, pH, and temperature will be performed on the first sample volume, and, if feasible, after sample collection as a check on the stability of the well water.

Sampling equipment will be decontaminated before use and between each well (USEPA, 1986, Sec. 4.2.4, p. 107). The following procedures will be followed as a minimum for decontamination:

- Remove visible contamination by wiping with an absorbent cloth.
- Wash with laboratory, non-phosphate detergent and a soft bristle brush.
- Rinse and flush with deionized water and by steam cleaning.
- Visually inspect the equipment to verify effective decontamination.
- Repeat steps if residual contamination is detected.

Bailing volumes, time, and field water quality measurements will be recorded in the field notebook.

2.5 Sample Collection

Samples will be collected for laboratory analysis and placed in pre-cleaned containers and preserved as indicated in Table 1. Samples requiring preservation will be filtered in the field during collection. All samples will be collected in accordance with EPA methods shown in Table 1.

In the collection of water samples for organic volatiles, the water sample should be gently placed into a vial to reduce agitation which might drive off volatile compounds. The samples should be placed into the vial without introducing air bubbles within the vial as it is being filled. Should bubbling occur, the sample must be poured out and the vial refilled. Each vial should be filled until there is a meniscus over the lip of the vial. The screw-top lid with the septum (teflon side toward the sample) should then be tightened onto the vial. After tightening the lid, the vial should be inverted and tapped to check for air bubbles. If there are any air bubbles present, the sample must be recollected. Two vials should be filled per sample location. Samples for analysis of organic chemicals should not be filtered.

2.6 Sample Labeling

Once samples have been collected and preserved, they will be sealed, labeled, custody-sealed, blister wrapped, sealed in a ziploc plastic bag, and placed in a cooler immediately. The cooler will be maintained at a constant temperature of 4 °C. All sealing, labeling, and Chain-of-Custody procedures will conform to Test Methods for Evaluating Solid Waste - Physical/Chemical Methods, EPA SW-846, 3rd Edition, 1986, revised 1987.

DRAFT

Labels will contain the following information:

- Sample number.
- Sample time and date.
- Sample location.
- Analysis required.
- Preservatives used.
- Sampler's name.

2.7 Sample Transport and Chain of Custody

Water samples will be transported to the laboratory under the custody of personnel of either the field-sampling contractor, the laboratory or by commercial carrier. If a commercial carrier is used to transport samples, United States Department of Transportation (DOT) regulations will be followed.

Samples will be properly packed and maintained at a constant temperature of 4 °C during storage and transport. The method of shipment and any unusual circumstances pertaining to the shipment will be recorded on the chain-of-custody form. Completed chain-of-custody forms will be placed in ziploc type bags and taped to the underside of the cooler lids. The front and back of the cooler lids will be custody sealed and taped closed.

The chain-of-custody form will be prepared to accompany the samples throughout the shipping and analytical process (USEPA, 1986, Sec. 4.4, p.114). An example of a chain-of-custody form is given at the end of this report. The chain-of-custody form will include:

- Sample number.
- Date and time sample collected.
- Date and time sample submitted to the laboratory.
- Sample collected by (signature).
- Sample matrix.
- Sample received by (signature).
- Remarks (e.g., expected interferences, hazards).
- Field filtering.
- Preservatives added (if any).
- Laboratory requested special preparations (filtering and preservation).
- Temperature for shipping.
- Maximum holding time.

A signed copy of the chain-of-custody form will be delivered to the project manager (Geosyntec Consultants) and kept on file for a minimum of three years.

DRAFT

3.0 QUALITY ASSURANCE

3.1 Field Preventive Maintenance

Preventive maintenance for quality assurance includes the minimization of down time of the measurement and sampling equipment. Field procedures for preventive maintenance include the following:

- Instruments for field measurements will be calibrated and checked before use.
- Spare parts for instruments, such as probes, will be on hand in case of equipment failure.
- When practical, backup equipment will be available.
- Sampling locations and procedures will be identified and reviewed prior to field work.
- Additional material for potential additional sample preparation such as containers, caps, and forms will be available on-site.

Permanent records of the calibration and maintenance of each instrument will be maintained and recorded in the field notebook.

3.2 Quality Control Samples

Quality Assurance/Quality Control (QA/QC) samples will be used to assess the effects of field and laboratory error on data quality. Field quality control samples will be used during sampling and comprised of travel blanks, equipment blanks, field blanks and duplicate samples (USEPA, 1986, Sec. 4.6.2, p. 120).

Travel (trip) blank samples will be samples prepared by filling representative sample bottles used in sample collection with known, *organic free* water. These samples will be transported with the sample collection bottles and analyzed for evidence of systematic contamination from sample transport, sample bottle cleaning, and laboratory storage. One travel blank will be analyzed per sampling round. The travel blank sample will be analyzed for volatile organic compounds because of potential for atmospheric contamination from volatile organic compounds.

Equipment blank samples will be collected if a teflon bailer is used to collect samples and is not dedicated to the well sampled from. The equipment blank sample will be collected in the following manner:

- Sampling device will be placed in or over a bucket that has been previously cleaned with distilled, deionized water.
- A volume of distilled, deionized water sufficient to thoroughly rinse the device (i.e., in the case of a bailer at least two gallons) will be run through the device.
- Water samples will be collected in appropriate sample containers from the bucket

over, or in which the device has been rinsed.

- The samples will be submitted to the laboratory for analysis.

One equipment blank sample, if appropriate, will be collected per ten wells sampled. The samples will be submitted to the laboratory for analysis.

Field blank samples consist of laboratory-purified water (distilled, deionized, organic-free) which is taken into the field and transferred from the water container to the individual sample containers in the field as a check on contamination in the atmosphere at the site. It is proposed to obtain one field blank at the project site during each sampling round. The field blank sample will be analyzed for volatile organic compounds.

Field duplicates samples consist of either co-located samples (i.e., sample collected consecutively from the same location) or split samples (i.e., samples from the same location which have been divided). Co-located samples allow an estimate to be made of the sampling variability whereas split samples are better for estimating laboratory variability. In the case of volatile organic compounds, split samples may not yield as accurate a concentration as co-located samples because of potential loss of volatiles during the homogenization and splitting processes. Therefore, it is proposed to obtain and analyze co-located duplicate samples for maximum concentration accuracy of volatile organic compounds. Split samples will be utilized for inorganic constituents. A duplicate sample will be collected for approximately one out of every ten samples collected. Analyses performed on the duplicate sample will be the same as performed on the regular samples (ROWD, Sec. 11.8.6.5, p. 11-63).

3.2 Laboratory Requirements

All samples will be analyzed by a laboratory which is certified to perform waste analyses by the California Department of Health Services. All analyses will be performed in accordance with EPA Test Methods for Evaluating Solid Waste, EPA SW-846, 3rd Edition, 1986, revised 1987, and EPA Methods for Chemical Analysis of Water and Wastes, EPA 600/4-90-020, 1990.

Prior to commencement of analytical work, the laboratory will submit its quality assurance plan for approval. At a minimum, the plan will document the following:

- Sample custody and management practices.
- Sample preparation and analytical procedures.
- Instrument maintenance and calibration procedures.
- Internal QA/QC measures; including the use of method blanks.

The laboratory will also provide batch specific, quality control results for the samples submitted for analysis.

DRAFT

TABLE 1: Parameters of Analysis

Parameters	Method (EPA)	Container P = Plastic G = Glass	Sample Size	Preservation	Holding Time
GENERAL MINERAL					
Alkalinity	310.2	P or G	100 ml	Cool 4 deg. C	14 days
Ammonia	350.1, 350.2	P or G	500 ml	Cool 4 deg. C, pH < H_2SO_4	28 days
Bicarbonate	SM 403	P or G	200 ml	Cool 4 deg. C	14 days
Carbonate		P or G			
Chemical Oxygen Demand	410.1, 410.4	P or G	100 ml	Cool 4 deg. C, pH < H_2SO_4	28 days
Chloride	9252	P or G	100 ml	None	28 days
Fluoride	310.2	P	100 ml	None	28 days
Hardness	130.2	P or G	100 ml	Cool 4 deg. C, pH < H_2SO_4	6 months
Nitrate	300.0	P or G	100 ml	Cool 4 deg. C	48 hours
pH	9040	P or G	100 ml	Cool 4 deg. C	immedi ately
Specific Conductance	120.1	P or G	120 ml	Cool 4 deg. C	28 days
Sulfate	9038	P or G	120 ml	Cool 4 deg. C	28 days
Surfactants	425.1	P or G	250 ml	Cool 4 deg. C	48 hours
Total Dissolved Solids	160.1	P or G	250 ml	Cool 4 deg. C	7 days
DISSOLVED METALS					
Antimony	7041	P	1 liter	Filter in field, 0.45 micron, pH <2 HNO_3	6 months
Arsenic	7060	P	1 liter	as above	6 months
Barium	6010	P	1 liter	as above	6 months
Beryllium	6010	P	1 liter	as above	6 months
Cadmium	7131	P	1 liter	as above	6 months

DRAFT

Parameters	Method (EPA)	Container P = Plastic G = Glass	Sample Size	Preservation	Holding Time
Calcium	6010	P	1 liter	as above	6 months
Chromium	7191	P	1 liter	as above	6 months
Copper	6010	P	1 liter	as above	6 months
Cobalt	6010	P	1 liter	as above	6 months
Iron	6010	P	1 liter	as above	6 months
Lead	7421	P	1 liter	as above	6 months
Magnesium	6010	P	1 liter	as above	6 months
Manganese	6010	P	1 liter	as above	6 months
Mercury	7470	P	500 ml	as above	6 months
Molybdenum	6010	P	1 liter	as above	6 months
Nickel	6010	P	1 liter	as above	6 months
Potassium	6010	P	1 liter	as above	6 months
Selenium	7740	P	1 liter	as above	6 months
Silver	6010	P	1 liter	as above	6 months
Sodium	6010	P	1 liter	as above	6 months
Thallium	6010	P	1 liter	as above	6 months
Vanadium	6010	P	1 liter	as above	6 months
Zinc	6010	P	1 liter	as above	6 months

DRAFT

Browning-Ferris Industries, personal communication, Oct 26, 1992.

Geosyntec Consultants, 1992. Report of Waste Discharge, Eagle Mountain Landfill and Recycling Center (ROWD).

State Water Resources Control Board, 1991. California Code of Regulations, Title 23. Waters: Barclays Law Publishers, South San Francisco, California.

U.S. Environmental Protection Agency, 1986. RCRA Ground-Water Monitoring Technical Enforcement Guidance Document (TEGD) OSWER-9550.1: U.S. Government Printing Office.

U.S. Environmental Protection Agency, 1987. Test Methods for Evaluating Solid Waste - Physical/Chemical Methods, EPA SW-846, 3rd Edition.

U.S. Environmental Protection Agency, 1990. Methods for Chemical Analysis of Water and Wastes, EPA 60/4-90-020.

E.S. Babcock & Sons, Inc., 1993. Chain of Custody and Sampling Forms.

DRAFT

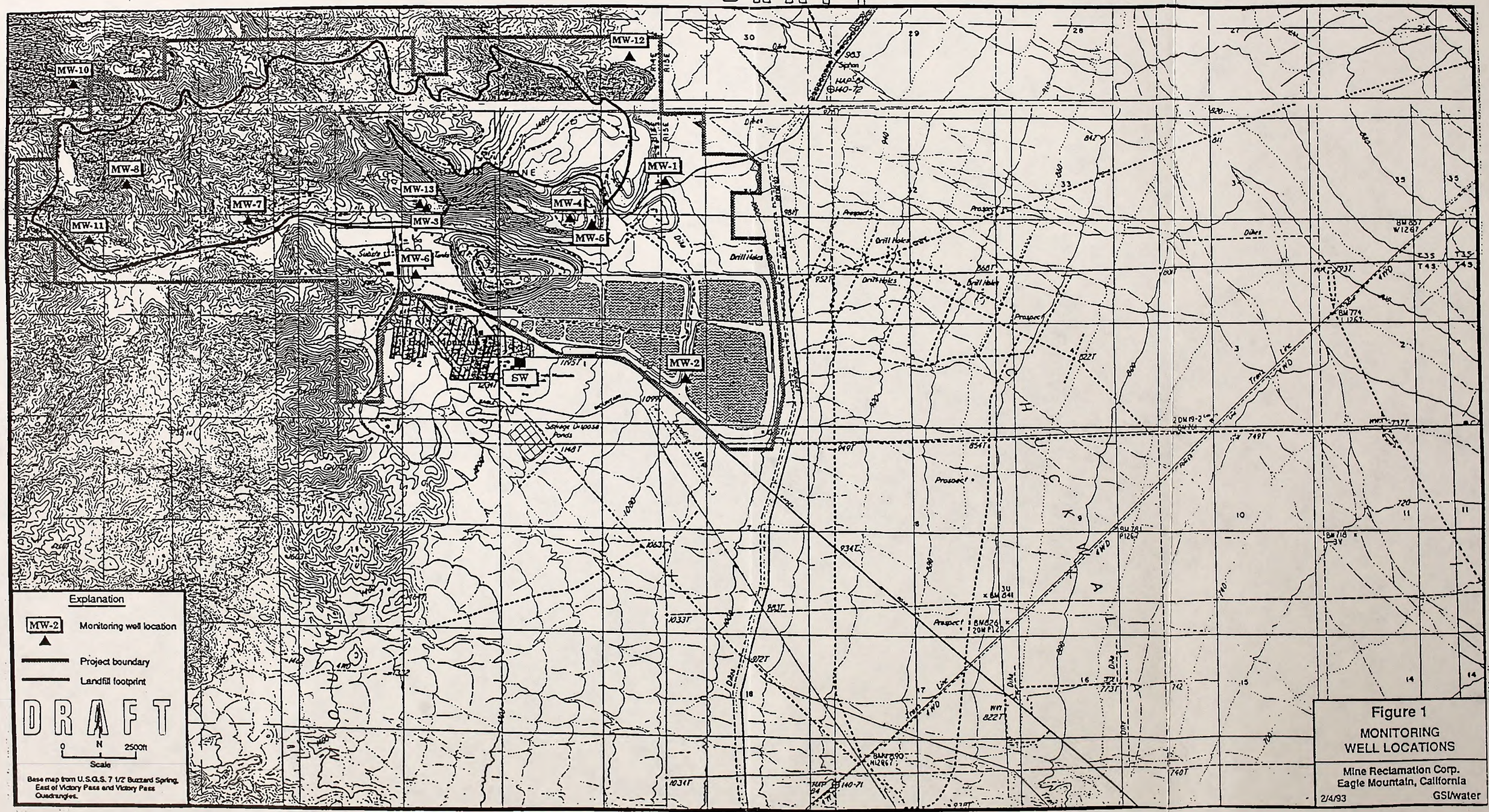


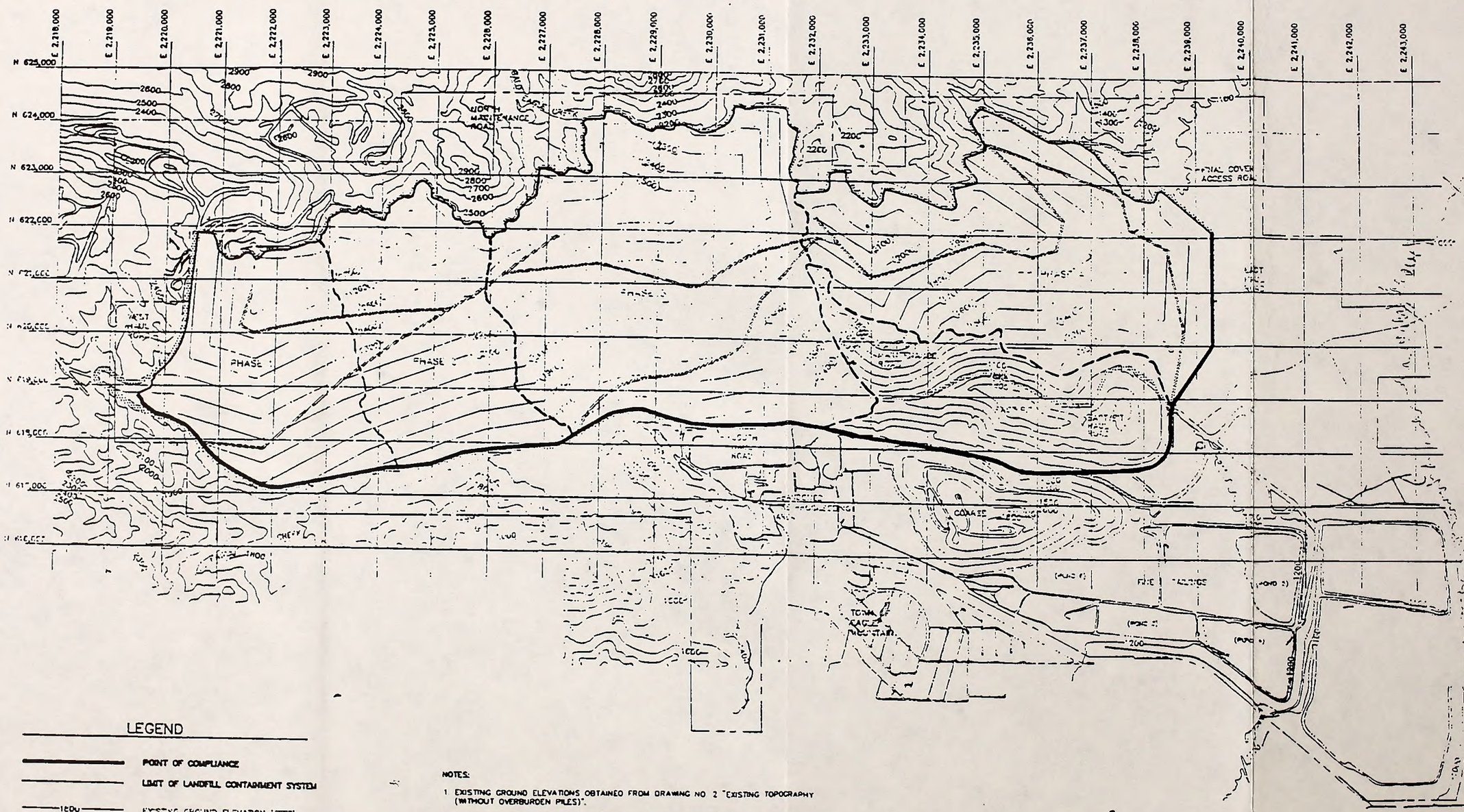
Figure 1

MONITORING WELL LOCATIONS

Mine Reclamation Corp.
Eagle Mountain, California

2/4/93 GSI/water

POINT OF COMPLIANCE GROUND-WATER MONITORING PROGRAM



LEGEND

- POINT OF COMPLIANCE
- LIMIT OF LANDFILL CONTAINMENT SYSTEM
- 1600 — EXISTING GROUND ELEVATION (FEET)
- 2100 — FINAL GRADE ELEVATION (FEET)
- PROJECT BOUNDARY
- LANDFILL PHASE BOUNDARY
- FINAL COVER ACCESS ROAD

NOTES:

1. EXISTING GROUND ELEVATIONS OBTAINED FROM DRAWING NO 2 "EXISTING TOPOGRAPHY (WITHOUT OVERBURDEN PILES)".
2. ELEVATIONS ARE IN FEET ABOVE SEA LEVEL, NATIONAL GEODETIC VERTICAL DATUM OF 1929.
3. LOCAL GRID COORDINATE SYSTEM ESTABLISHED BY C.M. ENGINEERING ASSOCIATES, SAN BERNARDINO, CALIFORNIA.
4. LIMIT OF LANDFILL CONTAINMENT SYSTEM SHOWN ON THIS DRAWING DEFINES THE WASTE MANAGEMENT UNIT BOUNDARY.
5. LOCAL GRID COORDINATE SYSTEM ESTABLISHED BY C.M. ENGINEERING ASSOCIATES, SAN BERNARDINO, CALIFORNIA.
6. THE LOCATION OF ANY CONTOUR ON THIS DRAWING IS ACCURATE TO WITHIN ± 50 FEET HORIZONTALLY AND VERTICALLY.
7. FINAL GRADE ELEVATION FOR PHASE 5 TO BE DEFINED.

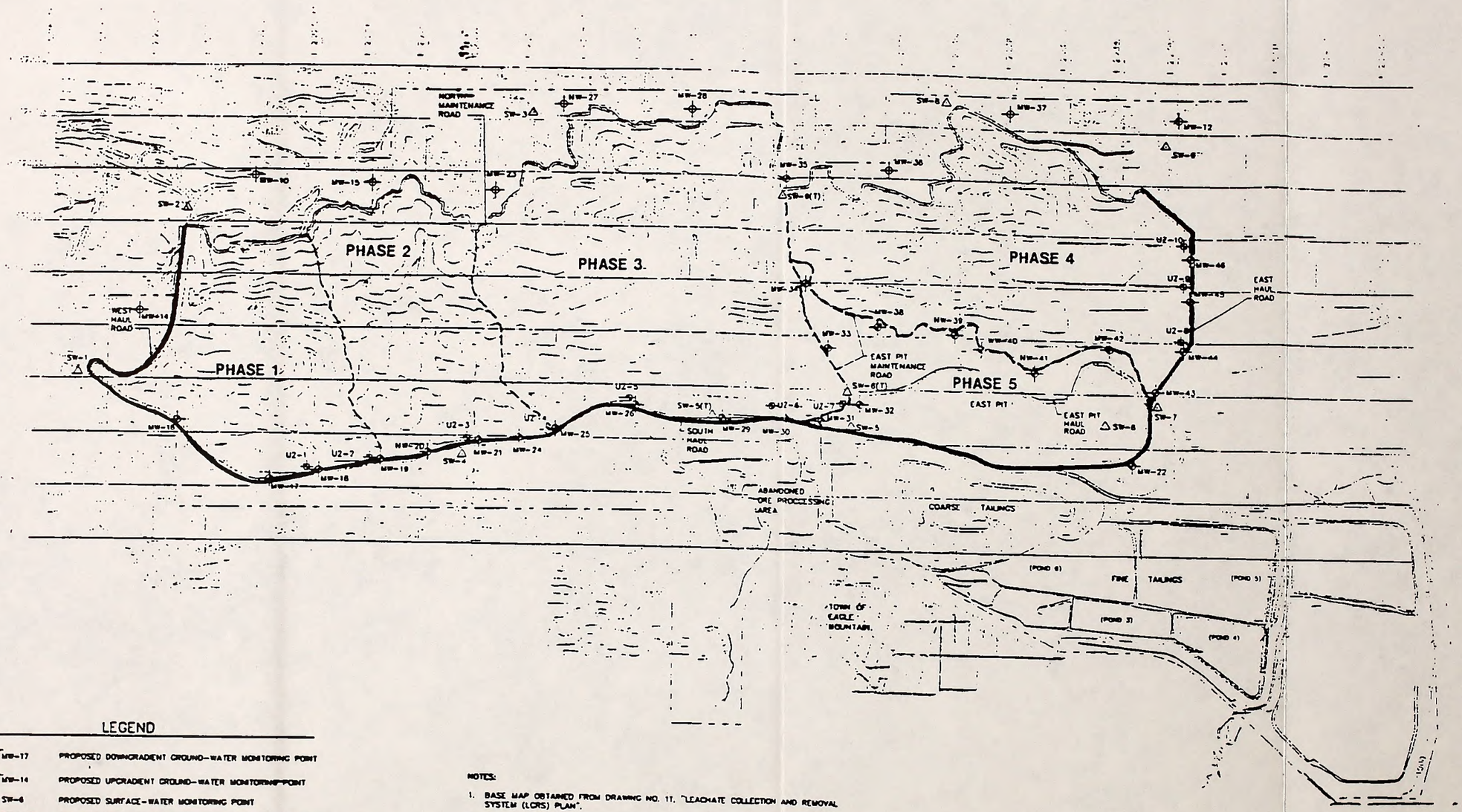
SOURCE: MODIFIED FROM GEOSYNTEC 1992

GeoSyntec Consultants
HUNTINGTON BEACH, CALIFORNIA

PROJECT NO.	GE3586-18	FIGURE NO.	13
DOCUMENT NO.	GA950904	FILE NO.	

327898

WATER-QUALITY MONITORING PLAN, PHASES 1 THROUGH 4



LEGEND

MW-17	PROPOSED DOWNGRADIENT GROUND-WATER MONITORING POINT
MW-14	PROPOSED UPGRADIENT GROUND-WATER MONITORING POINT
SW-6	PROPOSED SURFACE-WATER MONITORING POINT
SW-6(T)	PROPOSED TEMPORARY SURFACE-WATER MONITORING POINT
U2-3	PROPOSED UNSATURATED-ZONE LIQUID MONITORING POINT (SEE NOTE 9)
1800	FOUNDATION GRADE ELEVATION (FEET)
1800	EXISTING GROUND ELEVATION (FEET)
	PROJECT BOUNDARY
	LIMIT OF LANDFILL CONTAINMENT SYSTEM
	LANDFILL PHASE BOUNDARY
	HAUL ROAD OR MAINTENANCE ROAD
	LCRS DRAINAGE CORRIDOR
	INTERMITTENT CREEK FLOW LINE (APPROXIMATE)

SOURCE: MODIFIED FROM GEOSYNTEC 1992

NOTES:

1. BASE MAP OBTAINED FROM DRAWING NO. 17, "LEACHATE COLLECTION AND REMOVAL SYSTEM (LCRS) PLAN".
2. ELEVATIONS ARE IN FEET ABOVE SEA LEVEL, NATIONAL GEODETIC VERTICAL DATUM OF 1929.
3. LOCAL GRID COORDINATE SYSTEM ESTABLISHED BY C.M. ENGINEERING ASSOCIATES, SAN BERNARDINO, CALIFORNIA.
4. LIMIT OF LANDFILL CONTAINMENT SYSTEM SHOWN ON THIS DRAWING DEFINES THE WASTE MANAGEMENT UNIT BOUNDARY.
5. THE LOCATION OF ANY CONTOUR ON THIS DRAWING IS ACCURATE TO WITHIN ±50 FEET HORIZONTALLY.
6. ALL PROPOSED MONITORING POINTS SHOWN ON THIS DRAWING ARE NEW, EXCEPT PROPOSED MONITORING WELLS MW-10 AND MW-12, WHICH WERE PREVIOUSLY INSTALLED BY GSI/WATER, PASADENA, CALIFORNIA.
7. ALL NEW DOWNGRADIENT MONITORING WELLS WILL BE INSTALLED IN THE BERM ALONG THE INSIDE EDGE OF THE LANDFILL HAUL OR MAINTENANCE ROADS.
8. GROUND-WATER MONITORING WELL DETAILS ARE GIVEN ON DRAWING NO. 53, "GROUND-WATER MONITORING WELL DETAILS".
9. UNSATURATED-ZONE LIQUID MONITORING AT THE U2 MONITORING POINTS WILL OCCUR AT EACH UNSATURATED-ZONE MONITORING STATION. SEE DRAWING NO. 36, "LEACHATE COLLECTION AND REMOVAL SYSTEM (LCRS) DETAILS 8 (SIDE SLOPE RISER)".
10. MONITORING POINTS WILL BE INSTALLED IN PHASES, IN ADVANCE OF EACH PHASE OF LANDFILL DEVELOPMENT. THE SCHEDULE FOR INSTALLATION OF THE MONITORING POINTS, ALONG WITH OTHER DETAILS OF THE MONITORING PROGRAM, ARE GIVEN IN SECTION 11 OF THE REPORT OF WASTE DISCHARGE.

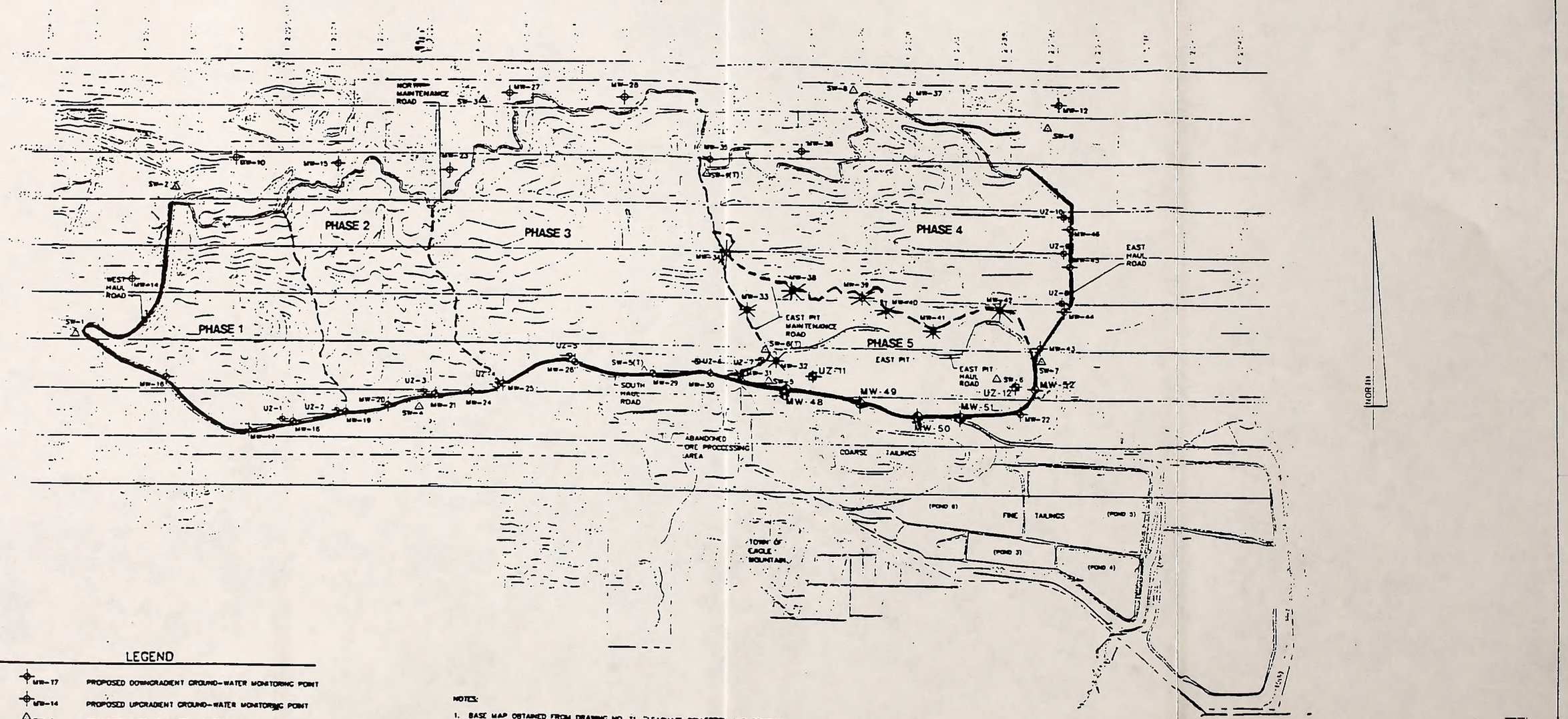
GeoSyntec Consultants
HUNTINGTON BEACH, CALIFORNIA

PROJECT NO. GE3586-18	FIGURE NO. 14
DOCUMENT NO. GA950904	FILE NO.

327696



WATER QUALITY MONITORING PLAN, PHASE 5



LEGEND

- MW-17 — PROPOSED DOWNGRADIENT GROUND-WATER MONITORING POINT
- MW-14 — PROPOSED UPGRADIENT GROUND-WATER MONITORING POINT
- SW-6 — PROPOSED SURFACE-WATER MONITORING POINT
- SW-6(T) — PROPOSED TEMPORARY SURFACE-WATER MONITORING POINT
- UZ-3 — PROPOSED UNSATURATED-ZONE LIQUID MONITORING POINT
- GROUND-WATER MONITORING POINT TO BE ABANDONED WHEN PHASE 5 IS DEVELOPED
- 1800 — FOUNDATION GRADE ELEVATION (FEET)
- 1800 — EXISTING GROUND ELEVATION (FEET)
- PROJECT BOUNDARY
- LIMIT OF LANDFILL CONTAINMENT SYSTEM
- LANDFILL PHASE BOUNDARY
- HAUL ROAD OR MAINTENANCE ROAD
- LCRS DRAINAGE CORRIDOR
- INTERMITTENT CREEK FLOW LINE (APPROXIMATE)

NOTES:

1. BASE MAP OBTAINED FROM DRAWING NO. T1, "LEACHATE COLLECTION AND REMOVAL SYSTEM (LCRS) PLAN".
2. ELEVATIONS ARE IN FEET ABOVE SEA LEVEL, NATIONAL GEODETIC VERTICAL DATUM OF 1929.
3. LOCAL GRID COORDINATE SYSTEM ESTABLISHED BY C.M. ENGINEERING ASSOCIATES, SAN BERNARDINO, CALIFORNIA.
4. LIMIT OF LANDFILL CONTAINMENT SYSTEM SHOWN ON THIS DRAWING DEFINES THE WASTE MANAGEMENT UNIT BOUNDARY.
5. THE LOCATION OF ANY CONTOUR ON THIS DRAWING IS ACCURATE TO WITHIN ±50 FEET HORIZONTALLY.
6. ALL PROPOSED MONITORING POINTS SHOWN ON THIS DRAWING ARE NEW, EXCEPT PROPOSED MONITORING WELLS MW-10 AND MW-12, WHICH WERE PREVIOUSLY INSTALLED BY GSI/WATER, PASADENA, CALIFORNIA.
7. ALL NEW DOWNGRADIENT MONITORING WELLS WILL BE INSTALLED IN THE BERM ALONG THE INSIDE EDGE OF THE LANDFILL HAUL OR MAINTENANCE ROADS.
8. GROUND-WATER MONITORING WELL DETAILS ARE GIVEN ON DRAWING NO. 53, "GROUND-WATER MONITORING WELL DETAILS".
9. UNSATURATED-ZONE LIQUID MONITORING AT THE UZ MONITORING POINTS WILL OCCUR AT EACH UNSATURATED-ZONE MONITORING STATION. SEE DRAWING NO. 78, "LEACHATE COLLECTION AND REMOVAL SYSTEM (LCRS) DETAILS 8 (SIDE SLOPE RISER)".
10. MONITORING POINTS WILL BE INSTALLED IN PHASES, IN ADVANCE OF EACH PHASE OF LANDFILL DEVELOPMENT. THE SCHEDULE FOR INSTALLATION OF THE MONITORING POINTS, ALONG WITH OTHER DETAILS OF THE MONITORING PROGRAM, ARE GIVEN IN SECTION 11 OF THE REPORT OF WASTE DISCHARGE.

1000 500 0 1000 2000
SCALE IN FEET

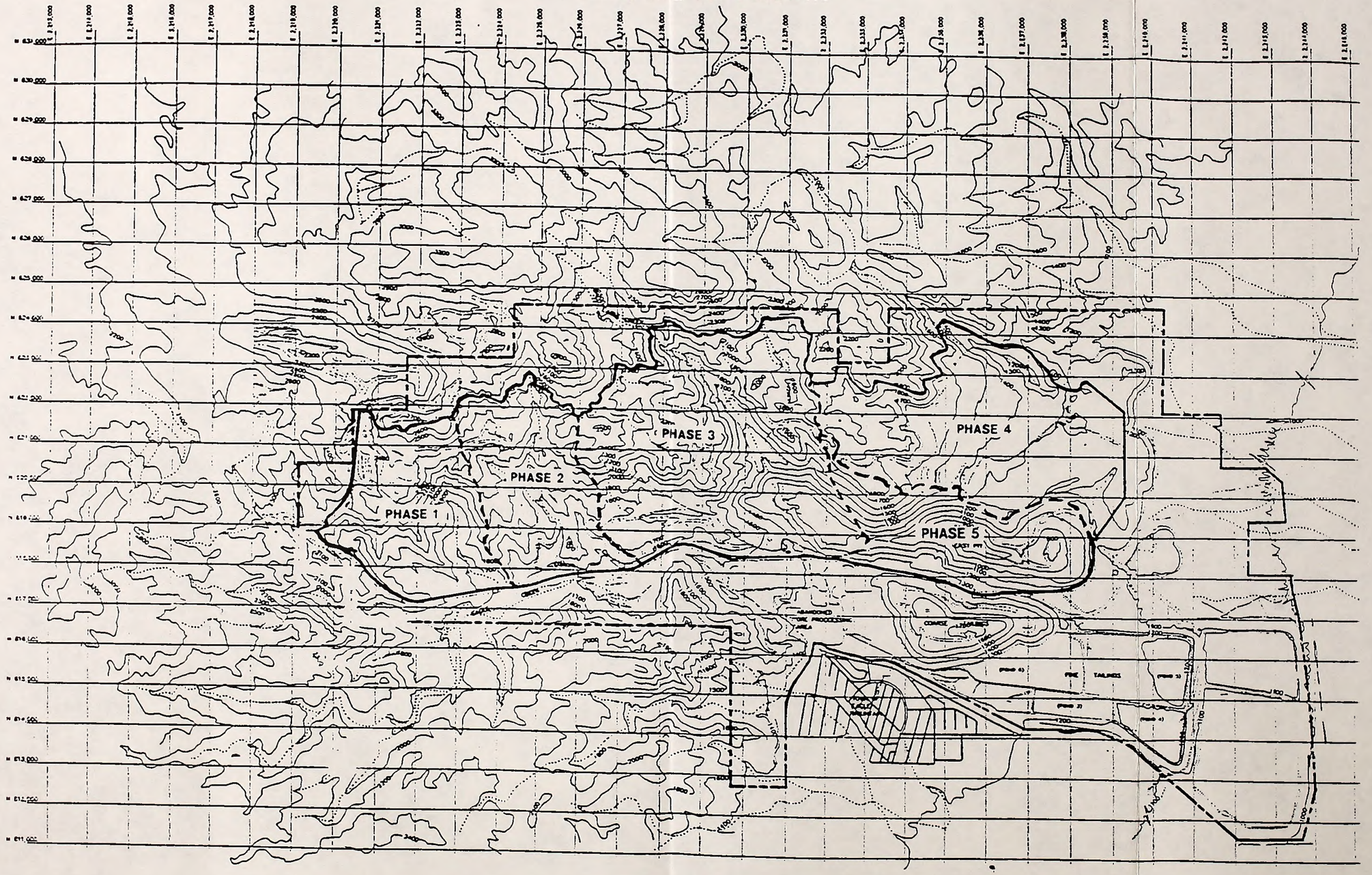
GeoSyntec Consultants
HUNTINGTON BEACH CALIFORNIA

PROJECT NO.	GE3586-18	FIGURE NO.	15
DOCUMENT NO.	GA950904	FILE NO.	

327606



EXISTING TOPOGRAPHY



LEGEND

- EXISTING GROUND ELEVATION (FEET) (SEE NOTE 1)
- PROJECT BOUNDARY
- LIMIT OF LANDFILL CONTAINMENT SYSTEM
- LANDFILL PHASE BOUNDARY
- INTERMITTENT CREEK FLOW LINE (APPROXIMATE)

NOTES:

1. EXISTING GROUND ELEVATIONS OBTAINED FROM A 23 JULY 1991 AERIAL SURVEY BY COOPER AERIAL SERVICES, TUSCON, ARIZONA.
2. ELEVATIONS ARE IN FEET ABOVE SEA LEVEL NATIONAL GEODETIC VERTICAL DATUM OF 1929.
3. LOCAL GRID COORDINATE SYSTEM ESTABLISHED BY C.M. ENGINEERING ASSOCIATES, SAN BERNARDINO, CALIFORNIA.
4. LIMIT OF LANDFILL CONTAINMENT SYSTEM SHOWN ON THIS DRAWING DEFINES THE WASTE MANAGEMENT UNIT BOUNDARY.
5. THE LOCATION OF ANY CONTOUR ON THIS DRAWING IS ACCURATE TO WITHIN ±50 FEET HORIZONTALLY.

SOURCE: MODIFIED FROM GEOSYNTEC 1992

GeoSyntec Consultants
HUNTINGTON BEACH, CALIFORNIA

PROJECT NO. GE3586-18	FIGURE NO. 3
DOCUMENT NO. GA950904	FILE NO.

327696

Appendix C-5

The Potential for Gas Generation and Leachate Production at the Proposed Eagle Mountain Landfill

THE POTENTIAL FOR GAS GENERATION AND LEACHATE PRODUCTION AT THE PROPOSED EAGLE MOUNTAIN LANDFILL

Report to:

Mine Reclamation Corporation

by:

Dr. R. K. Ham
2130 Chadbourne Avenue
Madison, WI 53705

assisted by:

Mr. Jeffrey Stinson
5402 Brookshire Lane
Madison, WI 53714

July 1990

EXECUTIVE SUMMARY

Mine Reclamation Corporation is developing the Eagle Mountain landfill at the former Eagle Mountain iron mine in eastern Riverside County, California. The landfill will accept municipal solid waste (MSW) primarily from the greater Los Angles metropolitan area, which is located generally 150 to 200 miles from the site.

This report addresses two of the most important public concerns identified about the landfill--potential contamination of groundwater by leachate and fugitive gas emissions.

The climate at the Eagle Mountain site is extreme, especially during the summer when temperatures over 120°F are common. The humidity is very low, and rainfall averages three inches per year. These conditions, plus the expected drainage of surface water off of the landfill, combine to preclude leachate generation on a regular basis at the bottom of the landfill. Small amounts of leachate may be generated intermittently, but this will be due to precipitation falling directly on the leachate collection system or on the first few feet of refuse during landfill operations. Any such leachate will be of low strength because of lack of contact with refuse, or flow through channels or voids in the refuse.

The lack of consistent moisture input from rainfall will result in moisture levels within the landfill being maintained essentially at the levels introduced with the waste at the time of landfilling. The lack of moisture flow will also limit biological decomposition of the waste, as moisture flow is known to be an important factor promoting decomposition by transporting microorganisms, substrate, nutrients, and moisture within a landfill.

There is little information available on the rate of MSW decomposition in landfills at low moisture contents. In general, less decomposition occurs with decreasing moisture contents over the range of 20 to 60% H_2O, with little to no decomposition suggested at moisture contents below 10 to 20% H_2O depending on the author and the basis for the conclusion.

The MSW components most likely to degrade are food waste and yard waste. This is because of their relatively high moisture contents as well as their inherent degradability. Food waste is expected to constitute 6% of the MSW (range 2-10%) and contain 70% H_2O (range 50-80%) on a wet weight basis. Yard waste is expected to constitute 30% of the MSW (range 24-36%) and contain 55% H_2O (range 30-80%). For an expected overall MSW moisture content of 21% as generated, food and yard waste will provide close to 95 to 98% of the moisture present in the waste. Note that some moisture will be lost during waste handling and transportation from the point of collection to disposal.

Diversion of 50% of the yard waste from the landfill to composting would result in the waste containing an average of 7% food waste and 17.6% yard waste and an overall moisture content of 15%. Recycling of glass, metal, plastics, and paper would not change the leachate and gas generation potential of the landfill, since these materials are assumed to not degrade and the loading rate of degradable waste is unaffected. If the final landfill volume remains the same, more food and yard wastes will eventually be placed in the landfill to fill the volume saved by recycling, but given the expected low rates of decomposition of these materials, the effect on gas and leachate generation will be small.

Assuming that 50% of the food and yard waste is eventually decomposed, 99.6 ft^3 of dry landfill gas of average composition 53.4% methane and 46.6% CO_2 (plus trace or minor components) would theoretically be produced per 100 pounds of entering MSW. If this gas is produced at a constant rate over a 30 year period, there would be 3.3 ft^3/year per 100 lb MSW of gas generated. Given the conditions at the landfill, it is likely that the actual amount of gas generated would be less.

Minor amounts of gases other than CO_2 and CH_4 will be generated. Hydrogen is one such gas. It is produced biologically, but because of the generally low rate of decomposition projected at the landfill, it will be generated at a low rate. Other gases arise by volatilization of liquids unavoidably contained in the MSW, such as solvents. Even though the amounts of minor or trace gases to be generated are projected to be small,

measurable concentrations of these gases can result within the landfill. This is due to the anticipated low rates of CO_2 and CH_4 generation, which will limit the dilution of minor gases in the landfill and the purging of these gases from the landfill.

INTRODUCTION

Mine Reclamation Corporation (MRC) is developing the former Kaiser Eagle Mountain iron mine into a municipal solid waste landfill. The project site is located in eastern Riverside County, California, approximately 180 miles from downtown Los Angeles.

Two of the most important public concerns identified about the development of this project are the potential for groundwater contamination by leachate and air pollution from fugitive landfill gas (LFG).

The temperature and humidity at Eagle Mountain, particularly during the summer time, are extreme. Daily temperatures over 120 degrees are common with the average daily summer temperature being about 110. The humidity at Eagle Mountain throughout the year is very low. Rainfall at Eagle Mountain averages about three inches per year, this being received mostly during thunderstorms experienced during the summer months.

The landfill will receive municipal solid waste (MSW) which will consist primarily of residential and commercial wastes plus smaller amounts of waste from schools and other institutions, government, roads, parks, etc. The composition of the waste is expected to change during the course of the landfill from future recycling and waste diversion efforts. Another change in the composition of the waste as landfilled is drying associated with waste handling, processing, transporting, and landfilling from the point of collection to disposal, especially under the extreme conditions at the landfill. Waste composition and moisture content is considered in the first major section of the report.

Biological decomposition of MSW in a landfill produces landfill gas and soluble matter. Biological decomposition is, therefore, instrumental in determining the potential for groundwater contamination and LFG emissions. Biological decomposition requires moisture, nutrients, substrate (decomposable materials in the waste), a source of microorganisms, and an environment suitable for biological activity (temperature, oxidation-reduction potential, pH). Of these requirements, moisture is expected to be the major limiting factor at Eagle Mountain. The second major section of this report evaluates moisture additions to and moisture losses from the landfill, and the moisture distribution within the landfill. This is followed by the third major section which discusses MSW decomposition at low moisture contents, such as predicted for the Eagle Mountain Landfill.

It should be noted that different types of biological activity can occur depending on conditions within a landfill. When refuse is first placed, oxygen is unavoidably trapped in the voids and aerobic biological activity will occur if the requirements listed in the previous paragraph are met. Typically, this oxygen is quickly exhausted (in a few weeks), so if no additional oxygen is supplied by diffusion from ambient air or as dissolved oxygen by precipitation, oxygen becomes limited and anaerobic biological decomposition develops.

Both aerobic and anaerobic decomposition involve complex associations of groups or species of microorganisms working together to degrade the waste, each with its special growth and substrate requirements and producing its own particular end products. Consequently, depending on conditions within the landfill, different microorganisms will dominate the decomposition process and the products of decomposition will change. At Eagle Mountain, there will be some initial aerobic decomposition, with production of LFG containing basically only CO_2. The majority of the decomposition, however, will be anaerobic, producing LFG which is close to 50% CH_4 and 50% CO_2, plus soluble matter special to the particular mix of organisms and growth conditions present in the landfill. Discussion of MSW decomposition and the potential for LFG and leachate generation will assume anaerobic processes dominate, but it is noted that limitations to biological activity

imposed by the moisture conditions at the Eagle Mountain Landfill are applicable to both aerobic and anaerobic decomposition.

The purpose of this report is to assess the potential for gas generation and leachate production at the proposed Eagle Mountain Landfill as set forth in a memorandum to Mr. Bob Collins from Mr. Bob Coale dated 2/26/90. This work was performed under Technical Services Agreements written April 6, 1990, between Mine Reclamation Corporation and the authors individually. The report is based on information supplied to R. K. Ham by R. D. Coale, available literature, and experience.

WASTE COMPOSITION

Decomposition of refuse to generate landfill gas is basically dependent on organic materials being available in the refuse that can be decomposed to support the required biological processes. The same is true to produce leachable materials, which give rise to the various components of leachate, although some minor amounts of soluble materials such as chlorides and sulfates, for example, may be leached directly without biological processes.

Waste Components and Moisture Contents - General

Many studies have developed data regarding the composition of municipal solid waste. Typical U.S. values on a component by component basis are shown in Table 1. Of these materials, those which might decompose in a landfill are paper and paperboard, food wastes, and yard wastes. Minor amounts of decomposable materials are also present in other components (e.g., food residues in containers, some textiles, wood over a very long period, etc.), but are neglected here.

There are two possible sources of moisture to trigger and support decomposition at a landfill. These are moisture within the waste and precipitation at the landfill. This assumes that the waste is covered after collection and during transfer and transportation until it reaches the landfill site, and that the site is not in contact with groundwater.

The moisture contents of waste components including detail from Wilson (1977) and general ranges and typical values from Tchobanoglous et al. (1977) are given in Table 2. The detailed values of Wilson should not be considered as precise as suggested by the number of significant digits, but they generally support the figures given by Tchobanoglous. It is clear from Table 2 that plastics, textiles, rubber, leather, and inorganic components contain little moisture. This fact plus their relatively small presence in MSW, see Table 1, is reason to disregard these materials for the purposes of this report.

TABLE 1 - 1984 Municipal Waste Composition in the United States

(Franklin Assoc. Ltd. (1986))

	% Wet Weight
Paper and Paperboard	37.1
Glass	9.7
Metals	9.6
Plastics	7.2
Rubber and Leather	2.5
Textiles	2.1
Wood	3.8
Food Wastes	8.1
Yard Wastes	17.9
Miscellaneous	1.9
	100.0

TABLE 2 - Moisture Content of Waste Components

Component	H_2O (wet wt.)		
	range*	typical*	as measured**
Paper and Paper Products			
Mixed paper			10.24
Newsprint			5.97
Brown paper			5.83
Trade magazines			4.11
Corrugated boxes			5.20
Plastic coated paper			4.71
Waxed milk cartons			3.45
Paper food cartons			6.11
Junk mail			4.56
Paper	4-10	6	
Cardboard	4-8	5	
Food and Food Wastes			
Vegetable food waste			78.29
Citrus rinds and seeds			78.70
Meat scraps (cooked)			38.74
Fried fats			0.00
Mixed garbage			72.00
Food wastes	50-80	70	
Trees, Wood, Brush, Plants			
Green logs			50.00
Rotten timber			26.80
Demolition softwood			7.70
Waste hardwood			12.00
Furniture wood			6.00
Evergreen shrubs			69.00
Balsam spruce			74.35
Flowering plants			53.94
Lawn grass I			75.24
Lawn grass II			65.00
Ripe leaves I			9.97
Ripe leaves II			50.00
Wood and bark			20.00
Brush			40.00
Mixed greens			62.00
Grass, dirt, leaves			21-62
Garden trimmings	30-80	60	
Wood	15-40	20	

* Tchobanoglous et al. (1977)
** Wilson (1977)

Table 2 (continued)

Plastics and Textiles			
Upholstery			6.90
Mixed plastics			2.00
Plastic film			3-20
Polyethylene			0.20
Polystyrene			0.20
Polyurethane			0.20
Polyvinyl chloride			0.20
Linoleum			2.10
Rags			10.00
Textiles			15-31
Oils, paints			0
-- -- -- -- -- -- -- -- -- --			
Plastics	1-4	2	
Textiles	6-15	10	
Rubber and Leather			
Tires			1.02
Leather			10.00
Leather shoe			7.46
Shoe heel and sole			1.15
Rubber			1.20
-- -- -- -- -- -- -- -- -- --			
Rubber	1-4	2	
Leather	8-12	10	
Inorganic Components			
Vacuum cleaner dirt			5.47
Household dirt			3.20
Street sweepings			20.00
Mineral			2-6
Metals			3-11
Ashes			10.00
-- -- -- -- -- -- -- -- -- --			
Glass	1-4	2	
Tin cans	2-4	3	
Nonferrous	2-4	2	
Ferrous	2-6	3	
Dirt, ash, brick	6-12	8	
Municipal Solid Waste	15-40	20	

Paper and paper products are major components of MSW, and these materials are ultimately degradable, but their low moisture contents indicate that they will contribute only minor amounts of moisture to the refuse. Only 11% of the moisture in MSW can be attributed to paper and paper products. Further, given the ability of paper and paper products to absorb moisture, paper and paper products can be disregarded as a supplier of moisture to other waste components or to the landfill in general. Finally, because of the low moisture content and the lack of nutrients to support decomposition in the absence of transport by liquid movement in the landfill, paper and paper products will also be disregarded as substrate for biological decomposition. Minor amounts of decomposition may occur in localized areas where the paper is particularly wet and where nutrients may happen to be available. Data obtained during the excavation of landfills in dry areas show little decomposition of such materials.

Based on the data in Tables 1 and 2, only the food waste and yard wastes are of real concern as carriers of water into the landfill and as substrate for potential decomposition to form leachable matter and gas. Tables 1 and 2 together suggest that food and yard wastes constitute, respectively, 8.1 and 17.9% of MSW, and provide 5.7 and 10.7 lb H_2O/100 lb MSW, or 29% and 54% of the moisture present in MSW. The remainder of this report will consider only food and yard wastes as degradable components.

Table 3, summarized from Tables 1 and 2 plus additional published sources, presents the food and yard waste percentages and moisture contents of U.S. municipal refuse. The term municipal refuse includes residential and commercial wastes, which are by far the largest components of MSW. Variable but lesser amounts of street sweepings, park litter, institutional wastes, demolition wastes (unless in large amounts) and some minor amounts of industrial wastes which unavoidably enter the overall waste stream constitute the remainder. Many of the entries in Table 3 were derived from studies carried out in the 1960's and 1970's and so must be treated cautiously.

TABLE 3 - U.S. Municipal Refuse Food and Yard Waste Percentages and Moisture Contents

Author	Specific Conditions	Food Wastes % (wet wt.) range	Food Wastes % (wet wt.) average	Food Wastes % H_2O (wet wt.) range	Food Wastes % H_2O (wet wt.) average	Yard Wastes % (wet wt.) range	Yard Wastes % (wet wt.) average	Yard Wastes % H_2O (wet wt.) range	Yard Wastes % H_2O (wet wt.) average	% H_2O for all wastes (wet wt.) range	% H_2O for all wastes (wet wt.) average
Bagchi (1990)	U.S.	4.4-15.3				12.5-24.2				27.1-35.0	
Tchobanoglous et al. (1977)	U.S.*	6-26	15	50-80	70	0.20	12	30-80	60	15-40	20
	Davis, CA		9.5				14.3				
Peavy et al. (1985)		6-26	14	50-80	70	0-20	12	30-80	60		
	Davis, CA		8.3				10.8				
Corey (1969)			12		60		12**		55**		20.7
Franklin & Assoc. (1986)	1984*		8.1				17.9				
	2000		6.8				15.3				
Wilson (1977)	summer, 1970		17.7		70		27.1		55.3		
	year ave., 1968		23.7		70		15.5		50		
	year ave., 1970		20				13.9				25.1
	year ave., 1980		16.1				12.9				22.0
	year ave., 1990		14.0				12.3				20.5
	year ave., 2000		12.1				11.9				19.9
Summary & Projections	U.S., 1990	6-26	12	50-80	70	0-20	16	30-80	55	15-40	21
	Summer/CA		10				25				

*from Tables 1 and 2

**grass, brush, greens, leaves (weighted)

Depending upon the duration of the growing season, the quantity of yard waste may be expected to fluctuate from area to area throughout the U.S. Table 4 gives an indication of the changes in yard wastes as percentages of MSW as a function of season and general climate. Considering southern California to be more typical of the southern states in the summer, a value of 22.5% yard wastes is derived from this table.

Wilson (1977) combined values from Table 4 with time projections to derive the values projected for MSW in the summer of 1970 as presented in Table 5 and entered in Table 3. These values would be more similar to what would be expected for southern California.

By examining trends and emphasizing data developed in the 1980s in Table 3, the summary and projected values as given at the bottom of the table for U.S. refuse in 1990 are food waste 12% with a moisture content of 70%, yard wastes, 16% with a moisture content of 55%, and an overall moisture content of 21% (wet weight basis). By considering waste generated in southern California, with a year long growing season, more likely similar to summer waste composition nationally, the values projected for the study area were developed as also shown in the table. These values are 10% food waste and 25% yard waste. Of special interest here are the moisture contents of the mixed wastes as well as for food and yard wastes, which are amazingly consistent throughout the table.

In summary, national data from several sources support the values projected for southern California in Table 3. These values will be compared with data obtained from studies of MSW at specific locations in southern California in the next section, and projections regarding the MSW composition at Eagle Mountain will be made.

Waste Components and Moisture Contents - Southern California

Table 6 summarizes data from a variety of sources for southern California. These data were developed for different reasons and have different degrees of general applicability,

TABLE 4 - Seasonal Average Percentage Yard Waste in MSW (1970)

(Adopted from Wilson (1977))

	Seasonal Average, % wet wt.				Yearly Average, % wet wt.
	Summer	Spring	Winter	Fall	
Northern states	22.9	11.1	0.3	6.4	10.2
Middle states	12.2	9.5	–	1.6	–
Southern states	22.5	9.2	6.8	5.2	10.9

TABLE 5 - Average Composition of MSW in Summer (1970)

(Adopted from Wilson (1977))

	% wet wt.
Paper	31.0
Yard wastes	27.1
Food wastes	17.7
Glass	7.5
Metal	7.0
Wood	2.6
Textiles	1.8
Leather and rubber	1.1
Plastics	1.1
Miscellaneous	3.1

TABLE 6 - Southern California Municipal Solid Waste
Food and Yard Waste Concentrations*

(as provided through SCS Engineers, Long Beach, CA, and the Bureau of Sanitation, City of Los Angeles)

Location	Specific Conditions	% Food Wastes (wet wt.)	% Yard Wastes (wet wt.)	% H_2O (wet wt.)
City of Los Angeles (Lopez Landfill)	Fall	6.3	40.0	
	Winter	9.1	32.3	
	Spring	10.5	38.3	
	Summer	14.4	30.6	
	Calculated Ave.	10.1	35.3**	
City of Los Angeles (assumed)	Processible Waste	4.3	53.25**	26.25
City of Los Angeles	Residential	8.8	35.6	
	Commercial	4.3	4.1	
	Total Wastes	4.4	16.1	
Santa Barbara Co. (SCS)	Winter-Spring	3.3	35.9	
	Summer	7.5	28.5	
	Overall	5.4	32.2	
Pasadena (SCS)	Residential	3	38	
	Commerc./Indust.	nd	21	
	Total	2 (approx.)	32	
Glendale (SCS)	Residential	3	36	
	Commerc./Indust.	nd	20	
	Total	2 (approx.)	28	
Burbank (SCS)	Residential	3	37	
	Commerc./Indust.	nd	18	
	Total	2 (approx.)	28	
Los Angeles Co.		5.7	24.3	
San Diego Co.		7.0	23.3	
	Residential	6.5	25.4	
Orange Co.	Residential	8.1	28.6	
City of Los Angeles	Residential	8.8	35.6	
So. California	SCS drill cores***			20.4 (7.2-53.8)
Summary Projections	-average	6	30	21
	-range	2-10	24-36	10-40

* Unless specified otherwise nd not determined

** Vegetation and wood

*** Average of 66 drill core samples from various landfills. Range for individual samples also shown. Range for

and so were interpreted accordingly in the summary entries at the bottom of the table. Some data refer to residential waste, some to commercial and industrial, and some to the total (including other small sources). Because the waste to be delivered to Eagle Mountain will most likely be mixed municipal waste, values reflecting this were emphasized in developing average summary figures at the bottom of Table 6, with the ranges likely to be observed within the various waste streams derived from different sources or routes. The data from Santa Barbara County and the Lopez Landfill support the assumption of the previous section that there is less seasonal variability in the study area than in the U.S. in general, and that significant amounts of yard waste are generated throughout the year.

Landfill moisture content values derived by SCS from drill core analyses obtained from various landfills are used here to help project MSW moisture contents. There is little MSW moisture content data specific to southern California so these values do supplement national data and data from the City of Los Angeles (Tables 3 and 6). Because the amount of rainfall entering the landfills is likely to be small, and some of this moisture taken up during wet periods is lost due to drying, there is expected to be little change in waste moisture content from generation as MSW to sampling as cores from the landfills. The landfills tested by SCS were not identified, so the likelihood of surface water run-on and runoff is not known. Diversion of rainfall from the landfills as runoff would improve the value of the SCS data to project waste moisture contents as generated, as the core moisture contents would more nearly correspond to the waste as generated. Surface water run-on from surrounding areas to the landfills tested by SCS would raise the moisture contents of the waste as measured by SCS above the moisture contents of the waste as generated, but run-on is unlikely in a well-designed landfill.

The projected averages for southern California refuse are 6% food waste (range 2 to 10), 30% yard waste (range 24-36), and 21% moisture, all on a wet weight basis (Table 6). The ranges reflect some seasonal effects, but, more importantly, the mix of residential and nonresidential wastes. Although the average moisture content is 21%, individually

mixed samples are likely to range from 10 to 40% based on the drill core range (excluding a few extreme samples). The values projected for the study area at the bottom of Table 3 (general U.S. figures) agree fairly well with the values shown at the bottom of Table 6, which were derived only from southern California studies.

Considering 6% of the MSW stream as food waste at a moisture content of 70% and 30% of the MSW stream as yard waste at a moisture content of 55%, food waste will contain an average of 4.2 lbs H_2O/100 lbs wet MSW, and yard waste will contain 16.5 lbs H_2O/100 lbs MSW. If the overall moisture content of MSW is 21%, food waste contributes 20% of the moisture, and yard waste 78%, leaving only 2% of the moisture in MSW to be provided by other waste components. This undoubtedly low value of 2% results from the overriding effect of moisture in yard wastes in particular. Wide fluctuations in the estimated moisture attributed to other components result depending upon the values used for the amount and moisture content of yard waste.

Other Factors Affecting the MSW Composition

The requirements of California AB 939 (the Recycling Bill) practically mandate that refuse be passed through a transfer/material recovery facility prior to the residue being transported to a landfill. Further, if the provisions of the Bill are to be achieved (25% waste diversion by 1995, 50% by 2000), yard or green waste will necessarily have to be removed. With the removal and separate processing of the yard waste, a substantial portion of the moisture will be diverted from the waste stream. It will be assumed in making projections from these waste composition figures that yard waste will be reduced by 50% through recycling (composting), but that no other changes will occur to materially affect the MSW composition delivered to the landfill. It is noted that recycling removes low moisture content items (glass, metal, plastic, paper), which are also items not likely to decompose at the landfill, so major changes in gas and leachate generation will be caused

by a reduction in yard and possibly food waste by composting, and not by recycling efforts.

Finally, there will be some drying of MSW during collection, transfer, processing, haul, and placement in the landfill. Considering the moisture contents of core drilling samples of landfilled waste were about the same as the projected average MSW moisture content, and 6% less than that obtained for processable waste (Table 6), and similar to that projected from general U.S. data (Table 3), it is difficult to conclude that there will be much change in moisture content at least until the material is discharged at the landfill working face. Alter (1983) indicates a 5% loss in moisture content of RDF as a result of densification, squeezing, heat from processing, and air-waste contact. It, therefore, seems reasonable to assume that a comparable 5% moisture loss could occur overall between the time of collection and placement and compaction in the landfill, dropping the final moisture content for the MSW as landfilled from 20 to 15%. It could be argued that more of the moisture loss will occur from paper than from yard or food waste, because of the difference in surface area and air-waste contact. Accordingly, this report will assume that no change in moisture content occurs for the critical components, namely, food and yard waste, and the moisture contents of these components in the landfill will be the same as concluded from Tables 1 through 6.

LANDFILL MOISTURE CONDITIONS

The purpose of this section is to evaluate the possibility and impact of any changes in the moisture content of the food and yard wastes once they are placed in the Eagle Mountain landfill. It was concluded in the previous section that food and yard wastes are the most likely MSW components to decompose as they contain not only the necessary decomposable materials but also the nutrients and moisture to support microbial processes.

Key elements that determine the amount of decomposition are moisture addition to the landfill, moisture loss from the landfill, and moisture movement and distribution of moisture levels within the landfill.

Moisture Additions to the Landfill

It will be assumed that there will be no groundwater-refuse contact at the Eagle Mountain landfill. Precipitation and water introduced with the waste are the only sources of water to the landfill. Moisture present in the waste was considered in the previous section. The Eagle Mountain area receives approximately three inches of rain per year and is hot and dry, with temperatures during the summer averaging 110°F. Most of the rain occurs during brief storms in the summer, when the potential for drying is maximized.

Any rain which falls directly on the landfill during operations would wet the uppermost layer or so, but even if all of the annual rainfall fell at once and did not evaporate, this is still only enough moisture to wet approximately 12 inches of refuse and bring it to field capacity. Field capacity is defined here as the moisture that can be held by refuse against the forces of gravity and capillary tension. The typical value used for estimation of the wetted front movement due to infiltration is 1 inch of infiltration per 3 to 4 inches of wetted front movement for typical MSW at typical densities in a landfill. Considering that the annual rainfall occurs over several events, with attendant evaporation between events, the actual amount of rainfall remaining in the refuse will advance the wetted front much less than the 12 inches and will therefore be insignificant for the landfill as a whole. There may be specific layers of refuse distributed throughout the landfill which may retain small amounts of moisture as a result of wetting during landfilling, but these layers will have an insignificant effect on gas production from the total landfill.

If all of the rainfall occurred in one event per year and there was no evaporation, assuming incoming refuse is placed in one huge 20 foot lift, the rain falling directly on the waste would bring only 5% of the waste to a moisture content approaching field capacity.

In other words, even under this extreme condition, only 5% of the waste would be affected by on-site rainfall. At the other extreme, if multiple lifts and well-drained cover prevents rainfall from contacting more than one day's active face of refuse, much less refuse would experience a moisture increase. A one-day supply of refuse is 1/313 of the yearly total, assuming 6 operating days per week. Under this scenario, 5% x 1/313 or 0.016% of the refuse would be brought to a moisture content adequate to easily initiate decomposition (near field capacity or 50% moisture on a wet weight basis).

Rain falling directly on the refuse at the landfill at Eagle Mountain will not be a significant source of moisture except in thin isolated layers distributed sporadically throughout the landfill. This source of moisture is insignificant compared to moisture introduced with the waste, specifically in the food and yard waste fractions.

Once the refuse is covered with soil, surface water hydrology and attendant effects describe moisture addition to the landfill via rainfall. The mechanism of water addition to the landfill is the same as that providing recharge to the groundwater in a non-landfill situation. There are models and methods for estimating recharge in wet climates, but these are questionable when applied to real-world situations, and even under straightforward, uncomplicated conditions, monthly predictions can vary from observed values by factors of 2 or more. In general, models do better in predicting average recharge rates over longer time periods--they do worse when trying to predict weekly or daily events.

Our understanding of groundwater recharge in arid areas is incomplete. Here, the major difficulty in predicting recharge is the lack of understanding of what happens in the vadose zone--the area between the bottom of the rooting zone and the water table. This zone is typically overlooked by both the surface water hydrology and the hydrogeology disciplines. Recharge in arid areas is highly variable--more so than in wet areas. Under similar arid climate and soil conditions, but with different plant cover and topography, the recharge can range from zero to more than the annual precipitation.

Flow through the vadose zone is difficult to define, especially under arid conditions. It is not subject to averaging in arid areas because there may be no flow for much of the year, yet suddenly a transient condition develops with considerable flow. Under some conditions, it is possible that all of this flow can lead to recharge, as evaporation is negligible in most of the vadose zone and transpiration may also be low to nonexistent depending on vegetation presence and root development. Flow through the vadose zone therefore varies with time, but it also varies spatially because of preferred paths of flow caused by surface topography (low points) and holes, cracks, and changes in hydraulic properties of soils within the zone. Flow in the vadose zone is characterized by transients and variability.

The most common method used to predict recharge and, hence, the amount of water eventually contacting refuse in a landfill, is the water balance. The water balance states that the amount of percolation or recharge is equal to the amount of precipitation less the amount of surface water runoff, evapotranspiration, and moisture uptake in the soil which is stored for later evapotranspiration. The latter term can be positive or negative depending on whether moisture is being stored (during wet periods) or released (during dry periods). A basic problem is that evapotranspiration is not predicted accurately under conditions where plant cover is sparse or where plants suffer seasonal water stress. When estimated by the water balance, recharge may be in error by an order of magnitude simply by unreliability of the measured or estimated precipitation and the actual evapotranspiration rate. Both numbers are small in an arid climate, so the difference is also small in absolute terms, with much inherent variability as a percentage of the difference. Even if it is assumed that seasonal soil moisture changes and runoff values are zero, uncertainty in precipitation (typically ± 5%) and evapotranspiration (say ± 10%) result in recharge estimates varying ± 100% or more. EPA's HELP model is widely used to predict leachate flows (recharge rates), but it is not useful under such extreme conditions as at Eagle Mountain.

A recent paper from South Africa by Blight et al. (1990) reports that water balance calculations performed at a landfill receiving 20 inches of precipitation per year predicted leachate flow at 39% of precipitation, and that monitoring within the landfill confirmed that leachate was being produced. The authors cite a paper by Keenan (1986) which predicts that if precipitation is less than 12.8 inches/year (325 mm), leachate will not be produced. They also cite a paper by Saxton (1983) which gives a figure of 15-25 inches (400 mm)/year as the boundary.

In the absence of monitoring the actual site of concern, the best data predicting recharge in arid climates have been obtained from lysimeters. Lysimeters must model the actual site, they must be big and deep, and they must be monitored over an extended period of time, especially when so much of the flow occurs over a short period of the year. The initial state of the lysimeter soil with respect to moisture content and distribution of moisture is critical to modeling real-world situations.

Lysimeters constructed in eastern Washington state, at Hanford, gave measured recharge rates ranging from zero to more than the precipitation depending on soil type and plant cover (Gee and Hillel (1988)). The average precipitation is 6 inches or 16 cm/year. For nonvegetated lysimeters, differences in recharge rates were attributed to differences in snow accumulation and snow melt, and initial soil moisture content. Soils that were relatively dry at the beginning of a precipitation event allowed less recharge at the bottom of the lysimeters, but once sufficient water had accumulated, they passed water downward like similar lysimeters that were initially wetter. Only slight changes in vegetation were found to be important in affecting recharge.

Jones and Skaggs (1989) describe a set of 9 foot lysimeters constructed at Hanford in 1984. Excluding initial data from lysimeters placed especially dry (which therefore had little recharge or drainage at first) for the year 9/84 through 8/85, of the 13.8 cm of precipitation, an average of 7.5 cm was evaporated and drainage averaged 4.2 cm. For the year 9/85 through 8/86, 21.7 cm of precipitation resulted in an average of 10 cm of

evaporation and 12.3 cm of drainage. It is noted that a significant amount of the precipitation occurs at Hanford as snowfall, which quickly entered the soil as snow melt upon thaw when evaporation was low. This is, therefore, a different situation than at Eagle Mountain, where such snowfall will not occur. The 30 to 50% of precipitation resulting in drainage measured at Hanford is expected to be much higher than will be experienced at Eagle Mountain.

Gee and Jones (1985) summarize the several sets of lysimeters constructed at Hanford to that time. They indicate that estimates of recharge to the water table range from zero to 8.5 cm/year, depending on the exact soil, plant, and climate condition for each lysimeter. They also provided estimates of recharge at other arid sites, as summarized in Table 7, taken directly from their report. The driest climate listed in the table is Saudi Arabia at 8 cm/year, which is comparable to that at Eagle Mountain, both with regard to precipitation and most likely temperatures (no freezing conditions or snow). Recharge was estimated at 25% or 2 cm/year using a tracer technique at Saudi Arabia. The exact figure at Eagle Mountain will depend on soil conditions, drainage, rainfall patterns, etc., but even at 25% of precipitation, recharge of 2 cm/year will be insignificant in changing the moisture content of the MSW or promoting moisture flow.

It is concluded from the above discussion and general experience in using water balances that no significant recharge or percolation will occur at the Eagle Mountain landfill. This is based on the assumption that off-site surface water will be diverted from the landfill and that the site will be sloped and provided with surface water collection systems to avoid ponding of water on-site. It is also assumed that reasonable care will be given to construct good cover, free of cracks, crevices, holes, etc., which, if located in a drainage area could transmit locally significant amounts of water into the landfill. Finally, it is assumed that cohesive, low permeability cover soils will be used for final cover and for any intermediate cover exposed for more than a few years. It is unlikely that recharge would occur with only 3 inches/year of precipitation, especially when one considers the

TABLE 7 - Reported Estimates of Recharge at Selected Arid Sites
(From Gee and Jones (1985))

Source	Location	Method	Annual Precipitation (cm)	Estimated Recharge (cm)	Recharge as % of Precipitation
Enfield, Hsieh and Warrick (1973)	Hanford Site (200 Area)	Darcy flux	16	<1	<6
Brownell et al. (1975)	(200 Area)	Neutron probe	16	0	0
Jones (1978)	(200 Area)	Neutron probe	16	<0.5	<3
Gee and Kirkham (1984)	(300 Area)	Neutron probe and lysimeter	28	6	21
Dincer, Al-Mugrin and Zimmerman (1974)	Saudia Arabia	Tritium tracer	8	2	25
Sammis, Evans and Warrick (1982)	Arizona	Darcy flux, tritium, temperature profile	100-150[a]	22	15 to 22
Allison, Stone and Hughes (1985)	Australia	Chloride tracer	30	1.4	5
Stephens (1985)	New Mexico	Darcy flux	18	4	22
Narasimhan, White and Tokunaga (1985)	Wyoming	Darcy flux	22	2.1	10

(a) Includes irrigation.

extensive amount of run-off and evaporation to be experienced at the Eagle Mountain site. If any recharge were to occur, because, for example, landfill surface contours allowed accumulation of runoff on site, it is observed that moisture flow downward will also be localized and will not apply to the landfill as a whole.

Moisture Losses from Within the Landfill

The first mechanism for moisture loss from within the landfill to be considered is evaporation of moisture from the refuse into the void spaces followed by diffusion and/or convective flow to the atmosphere. Assuming that water exerts its full vapor pressure in the refuse (mole fraction of water in leachate is essentially 1) and that the pressure in the landfill is one atmosphere, the mole fraction of water vapor in the void space is equal to the vapor pressure as a fraction of one atmosphere. To the extent the mole fraction of water vapor is basically zero in the atmospheric air, the change in water vapor concentration becomes the driving force for diffusion acting over some unknown thickness of cover and refuse at the surface of the landfill. Since there are no known measurements of water vapor concentrations at different depths in a landfill from the cover-atmosphere boundary, the flux will vary greatly depending on the distance over which the concentration gradient operates, even for a given value of the diffusion coefficient.

Diffusion of gas through a porous solid must take into account the available cross-sectional area and the effective path length which the molecules are required to travel. Based on Fick's Law, the diffusion of water vapor through porous solids can be described by the following equations (Baver et al. (1972)):

$$\frac{dq}{dt} = \frac{D_o A S (p_1 - p_2)}{l_e \quad \beta} = \frac{DA (p_1 - p_2)}{l \quad \beta}$$

where dq is the molar flow diffusing over time dt through area A. D_o is the coefficient of diffusion in air, D is the effective diffusion constant, S is the porosity of the solid, l_e is the

effective path length, and p_1 and p_2 are the partial pressures of the vapor on each side of length l of the solids.

A study of diffusion rates, as reported in Baver et al. (1972), showed that $D/D_o = 0.66S$. Using this relationship, the diffusion constant of water vapor in air at 0.275 cm^2/s, a soil porosity of 0.2, and a 10 foot depth over which the concentration of water vapor changes from saturation to zero (for zero humidity), the diffusion of water vapor from the landfill would amount to less than 50 lb/acre·day. Assuming a 150 foot depth of MSW at 1250 lb/yd^3, this represents an annual loss of about 0.025% of the water originally contained in the refuse--a negligible amount. Considering the size of the Eagle Mountain landfill and the fact that much of the landfill is below grade so that exposure to the atmosphere is minimized, it is assumed that the loss of moisture by this mechanism is negligible in comparison with the reservoir of moisture available in the MSW.

The second mechanism for moisture loss relates to decomposition of the MSW. This includes moisture taken up during decomposition plus moisture loss resulting from saturation of gases generated during decomposition leaving the landfill. Complete decomposition of organic matter to methane and CO_2 can theoretically produce as much gas as modeled by the following equation (Tchobanoglous et al., (1977)):

$$C_aH_bO_cN_d + \left(\frac{4a-b-2c-3d}{4}\right)H_2O \rightarrow \left(\frac{4a-b+2c+3d}{8}\right)CO_2 + \left(\frac{4a+b-2c-3d}{8}\right)CH_4 + dNH_3$$

Conversion will not be 100% efficient as modeled by this equation, but for purposes of estimation, it will be assumed that methanogenic decomposition is efficient and will at least approach the calculated values. Using the chemical composition of yard waste (grass, brush, greens, and leaves) and food wastes (garbage and fats) from the Purdue study (Corey (1969)), dry yard waste contains 41.6% C, 5.94% H, 4.26% O, and 1.21% N, and dry food waste contains 58.2% C, 8.77% H, 21.5% O, and 1.93% N. One pound of dry yard waste would take up 0.129 lb water and produce 12.44 ft^3 of gas at 51.3% CH_4 and 48.7% CO_2 for complete decomposition according to the above equation. One pound

of dry food waste would take up 0.376 lb water and produce 17.4 ft^3 of gas at 64.6% CH_4 and 35.4% CO_2. It is assumed that no more than one-half of this "complete" decomposition could actually occur. This is based on the amount of gas produced under close to ideal circumstances attributable to MSW in MSW-sewage sludge anaerobic digesters compared with the gas potential of the MSW as calculated by the above equation. The result is that up to 0.0644 lb water will be taken up during decomposition per pound of dry yard waste, and 6.22 ft^3 of gas will be evolved. One pound of dry food waste will take up to 0.188 lb water and evolve 8.7 ft^3 of gas.

It was previously estimated that the waste entering the landfill would average 6% food waste at 70% moisture and 30% yard waste at 55% moisture. Using 100 lb incoming MSW as a basis and assuming only 50% of the food and yard wastes are decomposed, a total of 1.21 lb water will be taken up during decomposition and 99.6 ft^3 gas of composition 53.4% methane and 46.6% CO_2 will be produced. This amounts to a total of approximately 6% of the initial moisture content of the waste as received (assumed at 21%), which will be lost due to decomposition. Given the uncertainty of gas generation rates under the dry landfill conditions, this moisture loss is considered to have negligible impact on the landfill.

At 40°C, the vapor pressure of water is 55 mm Hg and for basically pure liquid water in equilibrium with the water vapor in the gas in the landfill, the 99.6 ft^3 dry landfill gas generated will carry 7.8 ft^3 water vapor or 0.39 lb water. This represents a loss of 1.9% of the 21 pounds of water contained in the 100 pounds of incoming MSW, which is also concluded to be insignificant.

Moisture Movement and Distribution

Moisture movement has been shown to increase MSW decomposition rates as measured by methane gas generation as well as by other indicators of decomposition such as loss of solid matter (cellulose in particular) and leachate composition.

Numerous researchers since the early 1970s have observed that moisture movement, as obtained by leachate recycling, promotes refuse decomposition in a landfill. Most observations were under somewhat artificial circumstances, usually in a laboratory setting with controlled conditions, using selected shredded MSW with large amounts of moisture available. Explanations are now available to understand those cases where leachate recycling did not promote decomposition. The most common reasons for limited methane formation relate to acid souring of the MSW, usually by promoting rapid initial decomposition of readily decomposable sugars and starches which resulted in acidic degradation products (especially organic acids). If the leachate was neutralized prior to recycling, methane generation was enhanced, further indicating that leachate recycling does promote decomposition. There is yet no documented full-scale landfill test proving the effect of leachate recycling in a situation typical of sanitary landfill practice.

Leachate recycling can promote decomposition by increasing moisture movement, increasing the moisture content, and/or by attendant movement of nutrients, substrate, and decomposition products. Assuming that leachate flow is primarily within refuse particles, as opposed to channels or void space between refuse particles, in order to have leachate flow the refuse would have to soak up close to the amount of moisture that can be held against gravity and capillary forces (field capacity) so that excess moisture can pass downward to be collected and eventually recycled as leachate. In other words, the refuse moisture content must be high which in itself promotes decomposition. Further, refuse decomposition involves many different types or groups of microorganisms working together to eventually produce methane and CO_2, which underscores the need for transport of microorganisms or substrate, nutrients, and decomposition products specific to each microorganism. There are, therefore, several mechanisms by which leachate recycling accelerates decomposition rates.

Most of the research on leachate recycling has used shredded refuse, which would promote moisture flow within refuse particles and not in voids between particles, as

discussed in the previous paragraph. This is also one of the reasons why leachate recycling has worked so well. Shredded refuse in itself decomposes more rapidly because of the mixing of waste components and the increased particle surface area.

Results of leachate recycling with unprocessed or raw refuse have not been as dramatic, in part because of particle size and mixing (i.e., telephone books versus small paper particles distributed throughout a volume of mixed refuse), but also because of increased moisture flow through voids or channels between refuse particles. Depending on the degree of compaction and the composition of the waste, channel flow may be very high, lowering the benefits of leachate recycling proportionately. Baled refuse has been demonstrated to decompose more slowly, and channel flow of moisture is the primary reason. Refuse containing demolition debris or brush will have more channel flow. Channel flow is responsible for the common arrival of leachate at the bottom of a landfill long before field capacity or wetting of the refuse mass to its moisture holding capacity is attained.

There has been some research performed evaluating separately the factors involved in most leachate recycling experiments. The effect of shredding alone is well documented (e.g., Bookter and Ham, 1982), as is the effect of refuse moisture content (next section). The only research known to have addressed moisture movement separately from moisture content is that of Klink and Ham (1982), in which refuse taken from full-size landfills known to be producing methane was placed in cylinders approximately 3 feet long by 6 inches in diameter. Once consistent methane generation rates were established, different amounts of moisture were added, leachate was recycled or not, and moisture movement was promoted or not as separate variables. The latter was done by inverting the cylinder frequently and regularly so no leachate was allowed to accumulate at one end or the other of the cylinders. In this way, moisture levels above field capacity could be evaluated without promoting overall leachate flow. By stopping the cylinders in a vertical position, leachate flow occurred and leachate reaching the bottom was immediately recirculated to the top, in

effect maintaining the same overall refuse moisture content but adding moisture flow as a relatively independent variable. This work showed that methane generation rates were increased by 25 to 50% at basically the same moisture contents (necessarily above field capacity) by moisture flow alone.

The point in the above discussion is not so much to show that low moisture contents alone retard decomposition, for this will be considered more carefully later, but to emphasize the importance of moisture flow in promoting decomposition. In the absence of moisture flow, distribution of moisture as well as soluble substrates, nutrients, trace metals and microorganisms throughout the landfill is severely limited. Minor amounts of flow of specific substances will occur by diffusion, but this will be over short distances and take much time. Some moisture flow will occur due to capillary flow or wicking to wet components such as paper, but, both the amount of flow and the distance over which it occurs are expected to be small. The landfill becomes stratified, with refuse components continuing indefinitely at much the same moisture content, nutrient level, etc., as was present at placement. Because of this stratification, it is argued that only refuse components entering the landfill which themselves contain the necessary moisture, substrate and nutrients will decompose, essentially eliminating paper decomposition. The materials most likely to decompose are food and yard wastes, and decomposition of even these materials will be limited by their moisture contents, nutrient levels, etc., at the time of placement.

The concept of stratification of moisture levels and the extent of decomposition in landfills has been widely observed during the excavation of landfills for construction purposes, for gas or leachate withdrawal, and for archaeological investigations. Defined zones of widely different moisture contents have been observed at landfills many years old; green grass, readable paper, and even food scraps have been seen in landfills known to be decomposing to some degree because of methane production. The degree of stratification ranges from basically complete stratification in landfills in dry climates, some of which

have been excavated many years after landfilling, to virtually no stratificaton in shredded refuse landfills in wet climates. The latter has been tested observed in test landfill cells, not in full-scale landfills. Even in wet climates, some stratification occurs due to nonuniform moisture flow and distribution within the landfill which is caused by voids and by layers of materials of markedly different hydraulic properties (such as cover soils, brush, etc.).

Summary of the Landfill Moisture Situation

This section has emphasized the stratification of moisture levels within the landfill, with materials in the landfill maintaining basically the same moisture contents indefinitely at which they were placed. The lack of moisture flow into the landfill in the arid climate of the Eagle Mountain site means little movement of water within the landfill. This in turn means little redistribution or homogenization of moisture contents within the landfill. The lack of moisture movement also means lower decomposition rates. Finally, it was concluded that little moisture would be added to the waste once it is placed in the landfill and that minor amounts of moisture would be lost due to decomposition processes or to evaporation of water within the landfill.

REFUSE DECOMPOSITION AT LOW MOISTURE CONTENT LEVELS

Many studies have reported on the effect of moisture content on refuse decomposition, but the results are often contradictory or at least do not reinforce each other. This is because of variable refuse composition and biological situations at the beginning of observations, the use of different control variables and variables affecting the onset of methane formation, and the output data utilized to draw conclusions. For example, most studies start with freshly shredded MSW, but others have used raw unprocessed MSW, waste of unusual composition, or samples from full-scale landfills in some cases known to

be generating methane. Some researchers have let the refuse decompose on its own; others have used moisture addition, buffer addition, biological seed addition, nutrient addition, refuse diluents, preprocessed refuse, and leachate recycling. Finally, researchers have reported their observations based on total gas generation, methane concentration, or methane generation.

Clearly, methane generation is the best measurement to describe biological activity in most landfills, but this is the most difficult to measure accurately, and inadequate laboratory procedures are highlighted with this as the measured output. Reasonable methane generation rates are difficult to achieve in laboratory or field test cells.

No studies have been reported in the literature which attempted to model the effect of moisture on the decomposition of MSW at low moisture levels (< 20%). On the other hand, several researchers have reported empirical models which were used to describe the effect of moisture on the decomposition of natural materials such as grass litter, leaf litter, and tundra. These models may be useful for understanding moisture effects on the decomposition of yard wastes which are considered to be the largest decomposable fraction of MSW under the conditions expected at Eagle Mountain.

Temperature and moisture content have been described as the primary factors controlling decomposition rates. Work by Wildung et al. (1975) shows that the moisture content of arid grassland soils strongly affects the decomposition of grass litter at temperatures above 15°C. At temperatures greater than the 24°C, the results showed a significant increase in decomposition as moisture contents were increased from 5 to 20%.

In another extreme environment, Heal and French (1974) studied the effect of moisture content on the decomposition of tundra. They developed a nonlinear model which described the effect of both temperature and moisture on a weight loss basis as follows:

$$Y = 11.62 + 0.0147 \cdot T \cdot W^2 + 0.00152 \cdot T \cdot W^3$$

where: Y = percent mass loss (day^{-1})

T = temperature sum (°day > 0°)

W = soil moisture (percent of dry mass)

With an expected temperature of about 45°C within the Eagle Mountain landfill, this model shows approximately a 50% drop in the rate of decomposition for each 10% decrease in moisture from approximately 60 to 30%. However, as the moisture content falls below 30%, decomposition becomes much more sensitive to the moisture content and reduces to basically zero at moisture contents below 10%. This is the same trend shown by Wildung et al. (1975).

Most of the published results from studies concerning the effect of moisture on the decomposition of solid wastes involved moisture contents greater than 30%. Very little information is available in the literature for MSW decomposition at moisture levels below 30%. In a study concerning the aerobic decomposition of MSW, Golueke (1977) stated that "biological activity ceases at a moisture content of about 12%" and that as the moisture level decreases towards this level, the rate of microbiological activity becomes more retarded. In another study concerning the effect of moisture, Mandeville (1976) stated that "the anaerobic process is virtually nonexistent or occurs at a very slow rate when the moisture content falls below 25%." Unfortunately, neither work reported how these figures were derived.

Wilson (1977) reported that the limiting moisture content for bacterial activity was around 12 to 15% for composting. Hartz and Carlson (1973) indicate that there is no aerobic decomposition of MSW at less than 10% moisture. Doedens and Cord-Landwehr (1989) indicate that a moisture content greater than 30% is essential for satisfactory methane generation.

Christensen and Kjeldsen (1989), in a review of biochemical processes in landfills, summarize data from Rees (1980) describing an exponential effect of moisture content on gas generation over the range 25 to 60% moisture. The plot of data reproduced here as

Figure 1, indicates a sharp drop in gas production rate from MSW in laboratory experiments with decreasing moisture content, projected to be zero at less than 20 to 25% moisture.

Hartz and Ham (1983) placed samples of refuse from full-size landfills in gas-tight cylinders and monitored methane generation. After a period of monitoring, moisture was added to samples not producing methane. After additional monitoring to obtain consistent gas generation rates without leachate recirculation, leachate was recirculated. The data are summarized in Figure 2, which indicates a clear drop in methane generation rate at lower moisture content levels over a range of 22.9 to 46.2% without leachate recirculation. Assuming extension of the line is valid, the methane generation rate would be projected to be zero at approximately 10% moisture. With leachate recirculation, the moisture content was necessarily at least at field capacity and so ranged from an average of 41.5 to 60.9%. There was a sharp increase in methane generation rate with increasing moisture content with leachate recirculation.

Barlaz (1988) cites Emberton (1986) who took multiple samples from ten full-scale landfills, placed them in containers, and monitored gas composition and production for one year. The results, given in Figure 3, indicate the general trend to lower gas generation rates at lower moisture contents, but also indicate all samples produced some gas even at moisture contents as low as approximately 10%. It is assumed that gas measured is methane plus CO_2 and that samples were in fact producing both gases, as suggested in the description of the experiment and in the discussion of the results.

In reviewing the various data sources and comments by the various authors presented thus far, there appears at first to be a contradiction, with some writers concluding that there is no gas generation at moisture contents on the order of 10 to 15% or lower, and others projecting no gas generation below approximately 20% moisture content, and one writer measuring gas from several samples at moisture contents ranging from 10 to 20%. It is

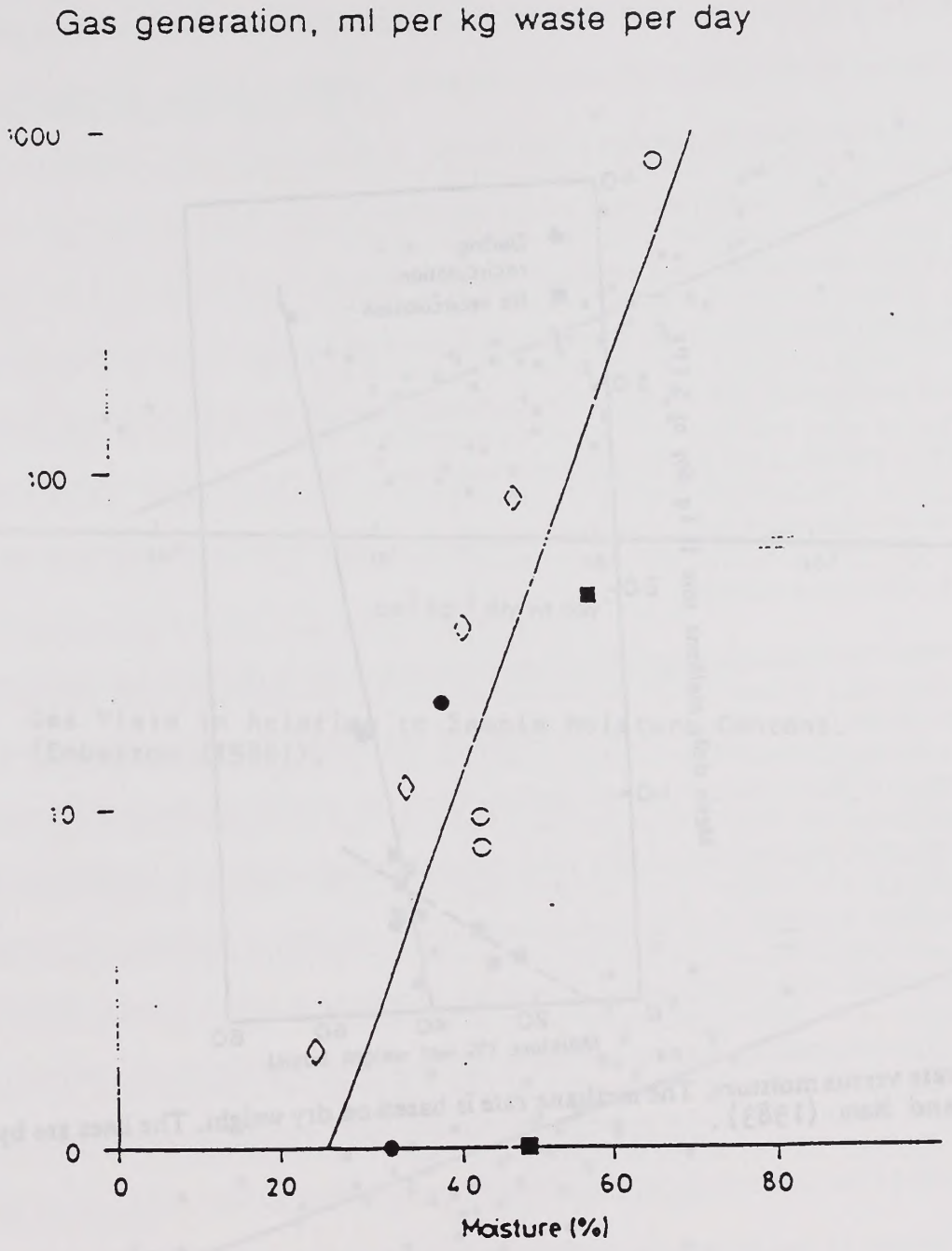


Figure 1. Gas generation rates as a function of moisture content of refuse in different laboratory samples (Rees (1980)).

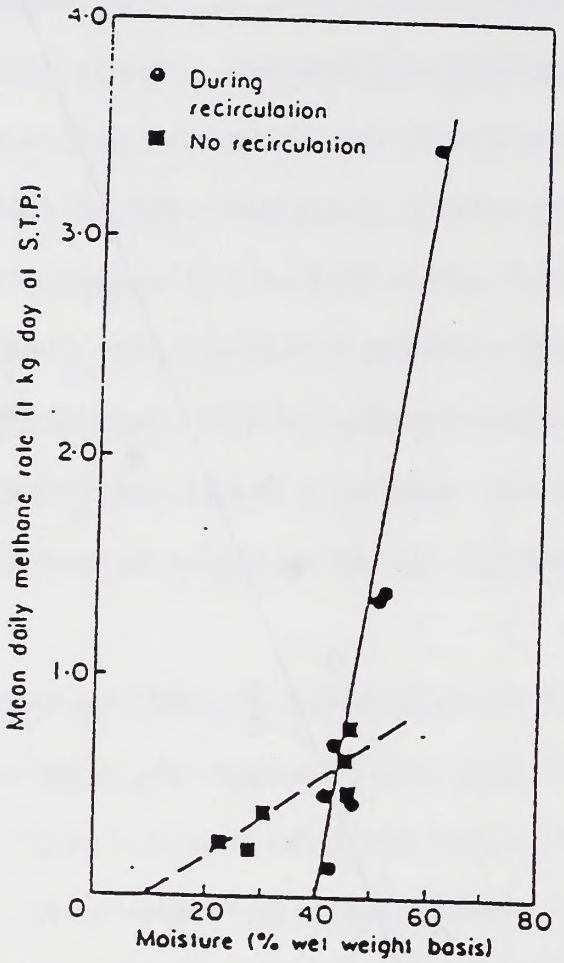


Fig. 2. Methane rate versus moisture. The methane rate is based on dry weight. The lines are by least squares. (Hartz and Ham (1983).

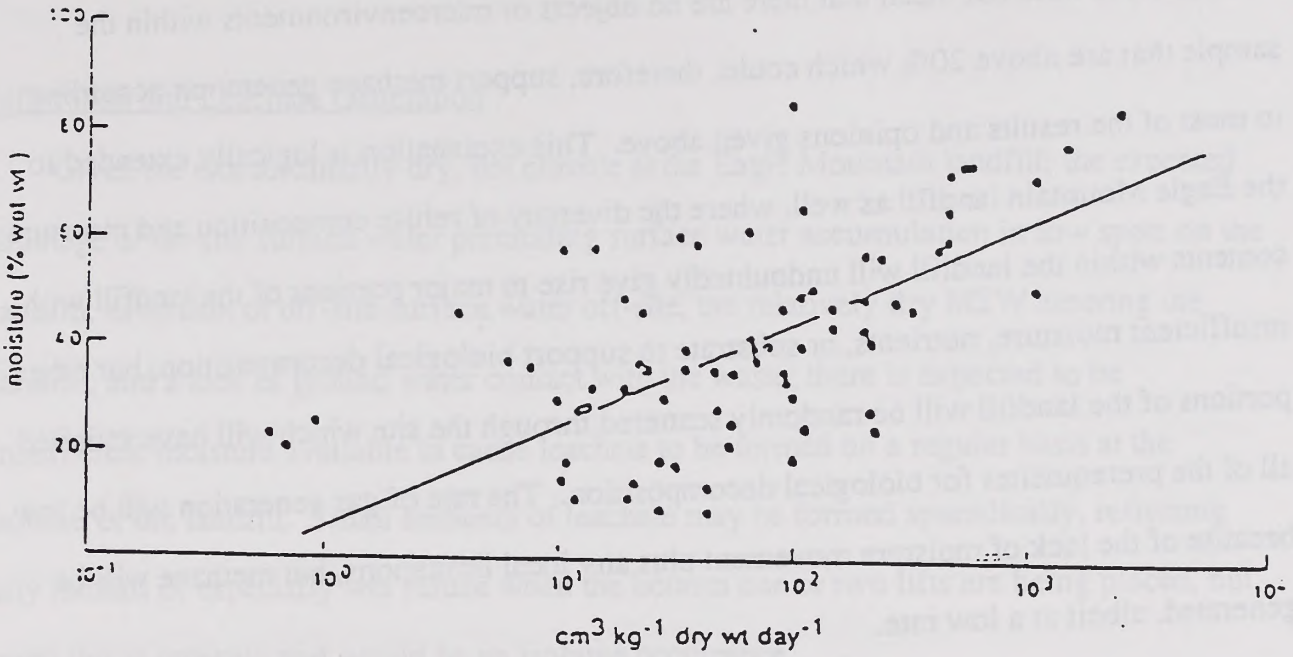


Figure 3a. Gas Yield in Relation to Sample Moisture Content. (Emberton (1986)).

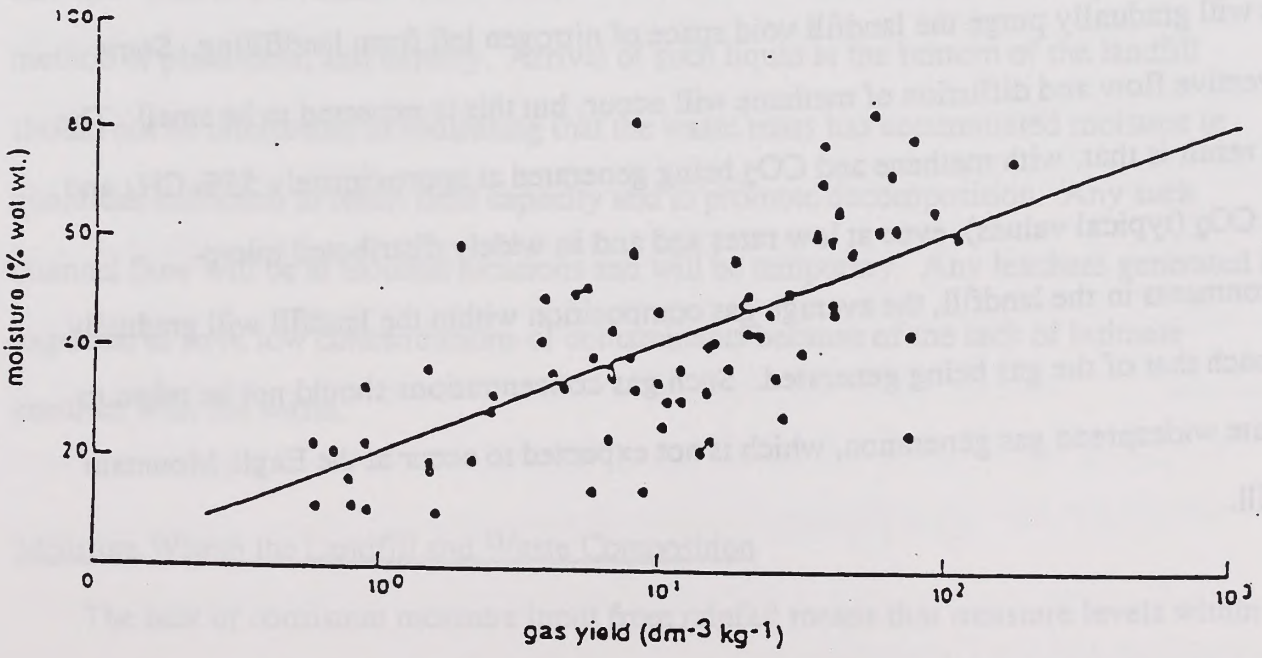


Figure 3b. Maximum Rate of Gas Production in Relation to Sample Moisture Content. (Emberton (1986)).

likely that the nonhomogeneous nature of refuse and landfills is the reason for this apparent discrepancy. If the overall moisture content of a refuse sample is given as 10%, for example, this does not mean that there are no objects or microenvironments within the sample that are above 20% which could, therefore, support methane generation according to most of the results and opinions given above. This explanation is logically extended to the Eagle Mountain landfill as well, where the diversity of refuse composition and moisture contents within the landfill will undoubtedly give rise to major portions of the landfill with insufficient moisture, nutrients, or substrate to support biological decomposition, but other portions of the landfill will be randomly scattered through the site which will have satisfied all of the prerequisites for biological decomposition. The rate of gas generation will be low because of the lack of moisture movement plus any local limitations, but methane will be generated, albeit at a low rate.

The result will be a buildup of methane concentration in the void spaces of the landfill. This must not be taken, however, as evidence of substantial decomposition. Given the lack of movement of other gases to purge methane from the landfill, methane will accumulate. This will gradually purge the landfill void space of nitrogen left from landfilling. Some convective flow and diffusion of methane will occur, but this is expected to be small. The final result is that, with methane and CO_2 being generated at approximately 55% CH_4 and 45% CO_2 (typical values), even at low rates and and in widely distributed micro-environments in the landfill, the average gas composition within the landfill will gradually approach that of the gas being generated. Such gas concentrations should not be taken to indicate widespread gas generation, which is not expected to occur at the Eagle Mountain landfill.

SUMMARY AND PROJECTIONS OF LFG AND LEACHATE GENERATION AT EAGLE MOUNTAIN

Infiltration and Leachate Generation

Given the extraordinarily dry, hot climate at the Eagle Mountain landfill; the expected drainage of on-site surface water precluding surface water accumulation in low spots on the landfill; diversion of off-site surface water off-site; the relatively dry MSW entering the landfill; and a lack of ground water contact with the waste; there is expected to be insufficient moisture available to cause leachate to be formed on a regular basis at the bottom of the landfill. Small amounts of leachate may be formed sporadically, reflecting any rainfall or especially wet refuse when the bottom one or two lifts are being placed, but even this is unlikely and would be an isolated occurrence.

Except for rain falling directly on the liner at the bottom of the landfill prior to refuse being placed, any liquid reaching the bottom will be as a result of channeling or flow through voids in the refuse which in turn will be a function of the refuse composition, method of placement, and density. Arrival of such liquid at the bottom of the landfill should not be interpreted as indicating that the waste mass has accumulated moisture in quantities sufficient to reach field capacity and to promote decomposition. Any such channel flow will be in isolated locations and will be temporary. Any leachate generated is expected to have low concentrations of contaminants because of the lack of intimate contract with the waste.

Moisture Within the Landfill and Waste Composition

The lack of consistent moisture input from rainfall means that moisture levels within the waste will be determined by the moisture content of the waste at the time of landfilling. Potentially degradable MSW components most likely to contain moisture at levels sufficient to sustain biological decomposition are food and yard wastes. Food waste is expected to

be 6% (range 2-10%) of the MSW and contain 70% H_2O (range 50-80%) wet weight. Yard waste is expected to be 30% (range 24-36%) of the MSW and contain 55% H_2O (range 30-80%) wet weight. For an overall MSW moisture content of 21%, food and yard waste will contain 21% and 78% of this moisture, respectively, using the average values.

Assuming a 50% reduction of yard wastes due to composting, for example, and no other changes in waste composition, the waste will average 7% food wastes and 17.6% yard waste, which will contain 33 and 66%, respectively, of the moisture in the mixed waste which will then be 15% on a wet weight basis. It is noted that recycling of paper, metal, glass, and plastics will change the waste flow, but not the net result as far as this analysis is concerned. These recyclable components are marginally or not degradable (metal, glass, plastics) or are potentially degradable but will not degrade at Eagle Mountain because of the dry conditions and their low initial moisture contents (paper). The input rate to the landfill of food and yard waste remains the same even though the percentages of these materials in the incoming waste change.

Moisture will be distributed throughout the landfill randomly according to where the different components of MSW are placed. Higher moisture contents will occur where food and yard wastes happen to have been placed; lower values will occur where paper, wood, miscellaneous inorganics, plastics, glass, etc., have been placed. Further, from the relatively dry characteristics of the waste and the lack of moisture flow from surface infiltration and percolation, there will be insignificant movement of moisture from one location to another and little homogenization of moisture levels throughout the landfill. This will leave the landfill stratified with respect to not only decomposable matter but also with respect to the moisture necessary to support decomposition.

Decomposition and Gas Generation

There is little information available in literature on MSW decomposition in landfills at low moisture content levels. The marked drop in decomposition rate with lower moisture

levels over the range of 20 to 60% H_2O is well documented; however, depending on the author and the basis for the conclusion, the effect of moisture contents below 20% is less certain. It is clear that decomposition rates at less than 20% H_2O are very low, and some references indicate that the rate is essentially zero at less than 10 to 15% H_2O. Given this information plus the lack of moisture flow at Eagle Mountain, it is concluded that food and yard wastes are the most likely components to decompose.

Stratification of the landfill with respect to both degradable matter and moisture will result in isolated pockets of biological decomposition scattered throughout the landfill. Some decomposition of food and yard waste will occur, but little else for lack of moisture, substrate, or nutrients to promote decomposition. The lack of moisture flow is critical in limiting decomposition, because even in a microenvironment which has adequate substrate or nutrients to promote decomposition, a buildup of partial degradation products or a lack of nutrient supply, both of which could be alleviated by moisture flow, will minimize or preclude decomposition.

Assuming that the food and yard wastes are eventually 50% decomposed, MSW containing 6% food waste at 70% moisture and 30% yard waste at 55% moisture will theoretically produce a total of 99.6 ft^3 of dry landfill gas of average composition 53.4% methane and 46.6% CO_2 (plus trace components) per 100 pounds of entering MSW. If it is assumed that this gas is produced at a constant rate over a 30 year period, the rate per 100 lb MSW would be 3.3 ft^3/year. This time period has been used elsewhere to estimate the decomposition period or period of active gas generation in dry climates. It is based on limited evaluation of gas production rates, compared with the calculated gas generation potential, and on mass balance considerations for the incoming waste. The use of a constant rate reflects the limitation imposed by the lack of moisture and moisture flow, which limits the rate of decomposition to materials availability and transport--not to biological kinetics which typically follow a first order kinetic relationship. It is noted that over the period of operations at the Eagle Mountain landfill, which is to be many years, it is

immaterial whether a first order or zeroth order (constant rate) kinetic model is used if the MSW input rate is the same per year because the gas generated per year is the same for the total landfill.

If the MSW composition changes because of a 50% reduction in yard wastes, 67.4 ft^3 of gas will be produced per 100 lbs MSW at a composition of 54.9% CH_4 and 45.1% CO_2. Over a 30-year life, this amounts to 2.2 ft^3/year per 100 lbs MSW.

These gas generation projections must be interpreted as likely maxima. Uncertainties exist in waste composition; waste moisture content; the effect of climate in adding to or removing moisture from the waste during storage, transfer, haul, and landfilling; input or removal of moisture at the landfill; and the degree to which decomposition and methane formation actually occur at the landfill. The last issue is of special importance as decomposition may be virtually nonexistent or may produce materials other than just methane and CO_2 (partial degradation products such as acetate and hydrogen, for example). The estimates are, however, based on available information and experience.

The final issue is gas composition regarding trace or minor gas components. Given the lack of moisture and the resulting stratification of and slow rates of decomposition, it is considered unlikely that significant amounts of gases other than CO_2 and CH_4 will result from decomposition processes. Considering the lack of gas generation to purge gases from the landfill, however, there may be measurable concentrations of hydrogen and other gases. If mature methanogenic decomposition occurs, with all of the necessary groups of microorganisms active in proper proportion, there will be no measurable hydrogen. However, under the conditions expected at Eagle Mountain, it is unlikely such a balanced biological system will be established, and measurable hydrogen will result. Concentrations up to 5% hydrogen are not unusual in some landfills, but values closer to 1% are more common.

Trace or minor organic gases are likely to arise by simple evaporation of waste components in the landfill. MSW unavoidably contains solvents, as from paints, thinners,

degreasers, dry cleaning, etc., which will volatilize. Given the lack of vigorous gas generation, only small amounts of such evaporation will result in measurable amounts of minor gas components being measured on a concentration basis. There is little to no dilution by landfill gas, and little to no purging of these gases by virtue of overall gas flow. Gaseous aromatic and chlorinated solvents are the most likely to be observed. Vinyl chloride, which is commonly found at low concentrations in landfill gas, arises from biological degradation of chlorinated solvents. Since little biological decomposition is anticipated, and since that which occurs is likely to be localized, it is expected that little vinyl chloride will be observed from biological activity. It is unknown whether measurable vinyl chloride will result from other sources, but even if it occurs it should be in small amounts.

REFERENCES

Alter, H., Materials Recovery from Municipal Waste, Marcel-Decker, Inc., New York, New York, p. 203, (1983).

Bagchi, A., Design, Construction, and Monitoring of Sanitary Landfill, Wiley-Interscience, New York, New York, p. 50, (1990).

Barlaz, M., Microbiological and Chemical Dynamics During Refuse Decomposition in a Simulated Sanitary Landfill, Ph.D. Thesis, University of Wisconsin, Madison, (1988).

Baver, L. D., Gardner, W. H., and W. R. Gardner, Soil Physics, John Wiley and Sons, Inc., New York, pp. 235-237, (1972).

Blight, G. E., Hojem, D. J., and J. M. Ball, "Generation of Leachate from Landfills in Water-Deficient Areas," Proceedings: Methane from Landfill Summer School, Rhodes University, Chemistry Department, Grahamstown, So. Africa, (January 29-31, 1990).

Bookter, T. J. and R. K. Ham, "Stabilization of Solid Waste in Landfills," ASCE, Journ. Ev. Eng. Div., 108, 1089-1100 (1982).

Christensen, T. H. and P. Kjeldsen, "Basic Biochemical Processes in Landfills," in Sanitary Landfilling: Process, Technology, and Environmental Impact, Christensen, Cassu, and Stegmann, Eds., Academic Press Inc., San Diego, CA, p. 29-49, (1989).

Corey, R. C., Principles and Practices of Incineration, Wiley-Interscience, New York, Table 1-3, p. 7, (1969).

Doedens, H. and K. Cord-Landwehr, "Leachate Recirculation" in Sanitary Landfilling: Process, Technology, and Environmental Impact, Christensen, Cossu, and Stegmann, Eds., Academic Press Inc., San Diego, CA, pp. 231-249, (1989).

Emberton, J. R., "The Biological and Chemical Characterization of Landfills," Proceedings of the Energy from Gas Symposium, Solihull, West Midlands, United Kingdom, (October 30-31, 1986).

Franklin and Associates Ltd., in World Wastes, (October 1986).

Gee, G. W., and D. Hillel, "Groundwater Recharge in Arid Regions: Review and Critique of Estimation Methods," Hydrological Processes, 2, pp. 255-266, (1988).

Gee, G. W. and T. L. Jones, "Lysimeters of the Hanford Site: Present Use and Future Needs," prepared for the U.S. Department of Energy, under contract DE-AC06-76 RLO 1830. Pacific Northwest Laboratory, Richland, Washington, p. 35, (October 1985).

Golueke, C. G, Biological Reclamation of Solid Wastes, Rodale Press, Emmaus, PA, p. 37, (1977).

Hartz, K. E. and R. G. Carlson, "The Multning Process for Disposal of Shredded Refuse," Public Works Magazine, p. 82, (December 1973).

Hartz, K. E. and R. K. Ham, "Moisture Level and Movement Effects on Methane Production Rates in Landfill Samples," Waste Management and Research, 1, pp. 139-145, (1983).

Heal, O. W. and D. D. French. "Decomposition of Organic Matter in Tundra," in Soil Organisms and Decomposition in Tundra, (Eds.) A. J. Holding et al., IBP Tundra Biome, pp. 279-310, (1974).

Jones, T. L. and R. L. Skaggs, "Influence of Hydrologic Factors on Leaching of Solidified Low-Level Waste Forms at an Arid Site Field-Scale Lysimeter Facility," Environmental Aspects of Stabilization and Solidification of Hazardous and Radioactive Wastes, ASTM STP 1033, (Eds.) P. L. Côté and T. M. Gilliam, American Society for Testing and Materials, Philadelphia, pp. 358-380, (1989).

Keenan, J. D., "Landfill Leachate Management," Jour. Resource Mgmt. & Technology, 14, 3, 177-188, (1986).

Klink, R. E. and R. K. Ham, "Effects of Moisture Movement on Methane Production in Solid Waste Landfill Samples," Resources and Conservation, 8, pp. 29-41, (1982).

Mandeville, R. D., "Fuel Gas from Landfill," in Clean Fuels from Biomass, Sewage, Urban Refuse, Agricultural Wastes, Symposium Paper, Institute of Gas Technology, Orlando, Florida, (January 27-30, 1976).

Peavy, H. S., Rowe, D. R., and G. Tchobanoglous, Environmental Engineering, McGraw-Hill, Inc., New York, New York, pp. 576-569, (1985).

Rees, J. F., "The Fate of Carbon Compounds in the Landfill Disposal of Organic Matter," Journ. of Chemical Technology & Biotechnology, 30, 161-175, (1980).

Saxton, K. E., "Soil Water Hydrology: Simulation for Water Balance Computations," Proceedings, Workshop on New Approaches in Water Balance Computations, Hamburg, W. Germany, (1983).

Tchobanoglous, G., Theisen, H., and R. Eliassen, Solid Wastes, McGraw-Hill, New York, New York, p. 10 and pp. 54-61, (1977).

Wildung, R. E., Garland, T. R., and R. L. Buschbom, "The Interdependent Effects of Soil Temperature and Water Content on Soil Respiration Rate and Plant Root Decomposition in Arid Grassland Soils," Soil Biology and Biochemistry, 7: 373-378, (1975).

Wilson, D. G. (editor), Handbook of Solid Waste Management, Van Nostrand Reinhold Co., New York, New York, pp. 12-39 and 204, (1977).

Appendix C-6
The Potential for Gas Generation and Leachate Production at the Proposed Eagle Mountain Landfill

THE POTENTIAL FOR GAS GENERATION AND LEACHATE PRODUCTION AT THE PROPOSED EAGLE MOUNTAIN LANDFILL

Report to:

Mine Reclamation Corporation

by:

Dr. R. K. Ham
2130 Chadbourne Avenue
Madison, WI 53705

assisted by:

Mr. Jeffrey Stinson
5402 Brookshire Lane
Madison, WI 53714

July 1990

EXECUTIVE SUMMARY

Mine Reclamation Corporation is developing the Eagle Mountain landfill at the former Eagle Mountain iron mine in eastern Riverside County, California. The landfill will accept municipal solid waste (MSW) primarily from the greater Los Angles metropolitan area, which is located generally 150 to 200 miles from the site.

This report addresses two of the most important public concerns identified about the landfill--potential contamination of groundwater by leachate and fugitive gas emissions.

The climate at the Eagle Mountain site is extreme, especially during the summer when temperatures over 120°F are common. The humidity is very low, and rainfall averages three inches per year. These conditions, plus the expected drainage of surface water off of the landfill, combine to preclude leachate generation on a regular basis at the bottom of the landfill. Small amounts of leachate may be generated intermittently, but this will be due to precipitation falling directly on the leachate collection system or on the first few feet of refuse during landfill operations. Any such leachate will be of low strength because of lack of contact with refuse, or flow through channels or voids in the refuse.

The lack of consistent moisture input from rainfall will result in moisture levels within the landfill being maintained essentially at the levels introduced with the waste at the time of landfilling. The lack of moisture flow will also limit biological decomposition of the waste, as moisture flow is known to be an important factor promoting decomposition by transporting microorganisms, substrate, nutrients, and moisture within a landfill.

There is little information available on the rate of MSW decomposition in landfills at low moisture contents. In general, less decomposition occurs with decreasing moisture contents over the range of 20 to 60% H_2O, with little to no decomposition suggested at moisture contents below 10 to 20% H_2O depending on the author and the basis for the conclusion.

The MSW components most likely to degrade are food waste and yard waste. This is because of their relatively high moisture contents as well as their inherent degradability. Food waste is expected to constitute 6% of the MSW (range 2-10%) and contain 70% H_2O (range 50-80%) on a wet weight basis. Yard waste is expected to constitute 30% of the MSW (range 24-36%) and contain 55% H_2O (range 30-80%). For an expected overall MSW moisture content of 21% as generated, food and yard waste will provide close to 95 to 98% of the moisture present in the waste. Note that some moisture will be lost during waste handling and transportation from the point of collection to disposal.

Diversion of 50% of the yard waste from the landfill to composting would result in the waste containing an average of 7% food waste and 17.6% yard waste and an overall moisture content of 15%. Recycling of glass, metal, plastics, and paper would not change the leachate and gas generation potential of the landfill, since these materials are assumed to not degrade and the loading rate of degradable waste is unaffected. If the final landfill volume remains the same, more food and yard wastes will eventually be placed in the landfill to fill the volume saved by recycling, but given the expected low rates of decomposition of these materials, the effect on gas and leachate generation will be small.

Assuming that 50% of the food and yard waste is eventually decomposed, 99.6 ft^3 of dry landfill gas of average composition 53.4% methane and 46.6% CO_2 (plus trace or minor components) would theoretically be produced per 100 pounds of entering MSW. If this gas is produced at a constant rate over a 30 year period, there would be 3.3 ft^3/year per 100 lb MSW of gas generated. Given the conditions at the landfill, it is likely that the actual amount of gas generated would be less.

Minor amounts of gases other than CO_2 and CH_4 will be generated. Hydrogen is one such gas. It is produced biologically, but because of the generally low rate of decomposition projected at the landfill, it will be generated at a low rate. Other gases arise by volatilization of liquids unavoidably contained in the MSW, such as solvents. Even though the amounts of minor or trace gases to be generated are projected to be small,

measurable concentrations of these gases can result within the landfill. This is due to the anticipated low rates of CO_2 and CH_4 generation, which will limit the dilution of minor gases in the landfill and the purging of these gases from the landfill.

INTRODUCTION

Mine Reclamation Corporation (MRC) is developing the former Kaiser Eagle Mountain iron mine into a municipal solid waste landfill. The project site is located in eastern Riverside County, California, approximately 180 miles from downtown Los Angeles.

Two of the most important public concerns identified about the development of this project are the potential for groundwater contamination by leachate and air pollution from fugitive landfill gas (LFG).

The temperature and humidity at Eagle Mountain, particularly during the summer time, are extreme. Daily temperatures over 120 degrees are common with the average daily summer temperature being about 110. The humidity at Eagle Mountain throughout the year is very low. Rainfall at Eagle Mountain averages about three inches per year, this being received mostly during thunderstorms experienced during the summer months.

The landfill will receive municipal solid waste (MSW) which will consist primarily of residential and commercial wastes plus smaller amounts of waste from schools and other institutions, government, roads, parks, etc. The composition of the waste is expected to change during the course of the landfill from future recycling and waste diversion efforts. Another change in the composition of the waste as landfilled is drying associated with waste handling, processing, transporting, and landfilling from the point of collection to disposal, especially under the extreme conditions at the landfill. Waste composition and moisture content is considered in the first major section of the report.

Biological decomposition of MSW in a landfill produces landfill gas and soluble matter. Biological decomposition is, therefore, instrumental in determining the potential for groundwater contamination and LFG emissions. Biological decomposition requires moisture, nutrients, substrate (decomposable materials in the waste), a source of microorganisms, and an environment suitable for biological activity (temperature, oxidation-reduction potential, pH). Of these requirements, moisture is expected to be the major limiting factor at Eagle Mountain. The second major section of this report evaluates moisture additions to and moisture losses from the landfill, and the moisture distribution within the landfill. This is followed by the third major section which discusses MSW decomposition at low moisture contents, such as predicted for the Eagle Mountain Landfill.

It should be noted that different types of biological activity can occur depending on conditions within a landfill. When refuse is first placed, oxygen is unavoidably trapped in the voids and aerobic biological activity will occur if the requirements listed in the previous paragraph are met. Typically, this oxygen is quickly exhausted (in a few weeks), so if no additional oxygen is supplied by diffusion from ambient air or as dissolved oxygen by precipitation, oxygen becomes limited and anaerobic biological decomposition develops.

Both aerobic and anaerobic decomposition involve complex associations of groups or species of microorganisms working together to degrade the waste, each with its special growth and substrate requirements and producing its own particular end products. Consequently, depending on conditions within the landfill, different microorganisms will dominate the decomposition process and the products of decomposition will change. At Eagle Mountain, there will be some initial aerobic decomposition, with production of LFG containing basically only CO_2. The majority of the decomposition, however, will be anaerobic, producing LFG which is close to 50% CH_4 and 50% CO_2, plus soluble matter special to the particular mix of organisms and growth conditions present in the landfill. Discussion of MSW decomposition and the potential for LFG and leachate generation will assume anaerobic processes dominate, but it is noted that limitations to biological activity

imposed by the moisture conditions at the Eagle Mountain Landfill are applicable to both aerobic and anaerobic decomposition.

The purpose of this report is to assess the potential for gas generation and leachate production at the proposed Eagle Mountain Landfill as set forth in a memorandum to Mr. Bob Collins from Mr. Bob Coale dated 2/26/90. This work was performed under Technical Services Agreements written April 6, 1990, between Mine Reclamation Corporation and the authors individually. The report is based on information supplied to R. K. Ham by R. D. Coale, available literature, and experience.

WASTE COMPOSITION

Decomposition of refuse to generate landfill gas is basically dependent on organic materials being available in the refuse that can be decomposed to support the required biological processes. The same is true to produce leachable materials, which give rise to the various components of leachate, although some minor amounts of soluble materials such as chlorides and sulfates, for example, may be leached directly without biological processes.

Waste Components and Moisture Contents - General

Many studies have developed data regarding the composition of municipal solid waste. Typical U.S. values on a component by component basis are shown in Table 1. Of these materials, those which might decompose in a landfill are paper and paperboard, food wastes, and yard wastes. Minor amounts of decomposable materials are also present in other components (e.g., food residues in containers, some textiles, wood over a very long period, etc.), but are neglected here.

There are two possible sources of moisture to trigger and support decomposition at a landfill. These are moisture within the waste and precipitation at the landfill. This assumes that the waste is covered after collection and during transfer and transportation until it reaches the landfill site, and that the site is not in contact with groundwater.

The moisture contents of waste components including detail from Wilson (1977) and general ranges and typical values from Tchobanoglous et al. (1977) are given in Table 2. The detailed values of Wilson should not be considered as precise as suggested by the number of significant digits, but they generally support the figures given by Tchobanoglous. It is clear from Table 2 that plastics, textiles, rubber, leather, and inorganic components contain little moisture. This fact plus their relatively small presence in MSW, see Table 1, is reason to disregard these materials for the purposes of this report.

TABLE 1 - 1984 Municipal Waste Composition in the United States

(Franklin Assoc. Ltd. (1986))

	% Wet Weight
Paper and Paperboard	37.1
Glass	9.7
Metals	9.6
Plastics	7.2
Rubber and Leather	2.5
Textiles	2.1
Wood	3.8
Food Wastes	8.1
Yard Wastes	17.9
Miscellaneous	1.9
	100.0

TABLE 2 - Moisture Content of Waste Components

Component	H_2O (wet wt.)		
	range*	typical*	as measured**
Paper and Paper Products			
Mixed paper			10.24
Newsprint			5.97
Brown paper			5.83
Trade magazines			4.11
Corrugated boxes			5.20
Plastic coated paper			4.71
Waxed milk cartons			3.45
Paper food cartons			6.11
Junk mail			4.56
-- -- -- -- -- -- -- -- -- --			
Paper	4-10	6	
Cardboard	4-8	5	
Food and Food Wastes			
Vegetable food waste			78.29
Citrus rinds and seeds			78.70
Meat scraps (cooked)			38.74
Fried fats			0.00
Mixed garbage			72.00
-- -- -- -- -- -- -- -- -- --			
Food wastes	50-80	70	
Trees, Wood, Brush, Plants			
Green logs			50.00
Rotten timber			26.80
Demolition softwood			7.70
Waste hardwood			12.00
Furniture wood			6.00
Evergreen shrubs			69.00
Balsam spruce			74.35
Flowering plants			53.94
Lawn grass I			75.24
Lawn grass II			65.00
Ripe leaves I			9.97
Ripe leaves II			50.00
Wood and bark			20.00
Brush			40.00
Mixed greens			62.00
Grass, dirt, leaves			21-62
-- -- -- -- -- -- -- -- -- --			
Garden trimmings	30-80	60	
Wood	15-40	20	

* Tchobanoglous et al. (1977)
** Wilson (1977)

Table 2 (continued)

Plastics and Textiles			
Upholstery			6.90
Mixed plastics			2.00
Plastic film			3-20
Polyethylene			0.20
Polystyrene			0.20
Polyurethane			0.20
Polyvinyl chloride			0.20
Linoleum			2.10
Rags			10.00
Textiles			15-31
Oils, paints			0
-- -- -- -- -- -- -- -- -- --			
Plastics	1-4	2	
Textiles	6-15	10	
Rubber and Leather			
Tires			1.02
Leather			10.00
Leather shoe			7.46
Shoe heel and sole			1.15
Rubber			1.20
-- -- -- -- -- -- -- -- -- --			
Rubber	1-4	2	
Leather	8-12	10	
Inorganic Components			
Vacuum cleaner dirt			5.47
Household dirt			3.20
Street sweepings			20.00
Mineral			2-6
Metals			3-11
Ashes			10.00
-- -- -- -- -- -- -- -- -- --			
Glass	1-4	2	
Tin cans	2-4	3	
Nonferrous	2-4	2	
Ferrous	2-6	3	
Dirt, ash, brick	6-12	8	
Municipal Solid Waste	15-40	20	

Paper and paper products are major components of MSW, and these materials are ultimately degradable, but their low moisture contents indicate that they will contribute only minor amounts of moisture to the refuse. Only 11% of the moisture in MSW can be attributed to paper and paper products. Further, given the ability of paper and paper products to absorb moisture, paper and paper products can be disregarded as a supplier of moisture to other waste components or to the landfill in general. Finally, because of the low moisture content and the lack of nutrients to support decomposition in the absence of transport by liquid movement in the landfill, paper and paper products will also be disregarded as substrate for biological decomposition. Minor amounts of decomposition may occur in localized areas where the paper is particularly wet and where nutrients may happen to be available. Data obtained during the excavation of landfills in dry areas show little decomposition of such materials.

Based on the data in Tables 1 and 2, only the food waste and yard wastes are of real concern as carriers of water into the landfill and as substrate for potential decomposition to form leachable matter and gas. Tables 1 and 2 together suggest that food and yard wastes constitute, respectively, 8.1 and 17.9% of MSW, and provide 5.7 and 10.7 lb H_2O/100 lb MSW, or 29% and 54% of the moisture present in MSW. The remainder of this report will consider only food and yard wastes as degradable components.

Table 3, summarized from Tables 1 and 2 plus additional published sources, presents the food and yard waste percentages and moisture contents of U.S. municipal refuse. The term municipal refuse includes residential and commercial wastes, which are by far the largest components of MSW. Variable but lesser amounts of street sweepings, park litter, institutional wastes, demolition wastes (unless in large amounts) and some minor amounts of industrial wastes which unavoidably enter the overall waste stream constitute the remainder. Many of the entries in Table 3 were derived from studies carried out in the 1960's and 1970's and so must be treated cautiously.

TABLE 3 - U.S. Municipal Refuse Food and Yard Waste Percentages and Moisture Contents

Author	Specific Conditions	Food Wastes % (wet wt.) range	Food Wastes % (wet wt.) average	Food Wastes % H_2O (wet wt.) range	Food Wastes % H_2O (wet wt.) average	Yard Wastes % (wet wt.) range	Yard Wastes % (wet wt.) average	Yard Wastes % H_2O (wet wt.) range	Yard Wastes % H_2O (wet wt.) average	% H_2O for all wastes (wet wt.) range	% H_2O for all wastes (wet wt.) average
Bagchi (1990)	U.S.	4.4-15.3				12.5-24.2				27.1-35.0	
Tchobanoglous et al. (1977)	U.S.*	6-26	15	50-80	70	0.20	12	30-80	60	15-40	20
	Davis, CA		9.5				14.3				
Peavy et al. (1985)		6-26	14	50-80	70	0-20	12	30-80	60		
	Davis, CA		8.3				10.8				
Corey (1969)			12		60		12**		55**		20.7
Franklin & Assoc. (1986)	1984*		8.1				17.9				
	2000		6.8				15.3				
Wilson (1977)	summer, 1970		17.7		70		27.1		55.3		
	year ave., 1968		23.7		70		15.5		50		
	year ave., 1970		20				13.9				25.1
	year ave., 1980		16.1				12.9				22.0
	year ave., 1990		14.0				12.3				20.5
	year ave., 2000		12.1				11.9				19.9
Summary & Projections	U.S., 1990	6-26	12	50-80	70	0-20	16	30-80	55	15-40	21
	Summer/CA		10				25				

*from Tables 1 and 2

**grass, brush, greens, leaves (weighted)

Depending upon the duration of the growing season, the quantity of yard waste may be expected to fluctuate from area to area throughout the U.S. Table 4 gives an indication of the changes in yard wastes as percentages of MSW as a function of season and general climate. Considering southern California to be more typical of the southern states in the summer, a value of 22.5% yard wastes is derived from this table.

Wilson (1977) combined values from Table 4 with time projections to derive the values projected for MSW in the summer of 1970 as presented in Table 5 and entered in Table 3. These values would be more similar to what would be expected for southern California.

By examining trends and emphasizing data developed in the 1980s in Table 3, the summary and projected values as given at the bottom of the table for U.S. refuse in 1990 are food waste 12% with a moisture content of 70%, yard wastes, 16% with a moisture content of 55%, and an overall moisture content of 21% (wet weight basis). By considering waste generated in southern California, with a year long growing season, more likely similar to summer waste composition nationally, the values projected for the study area were developed as also shown in the table. These values are 10% food waste and 25% yard waste. Of special interest here are the moisture contents of the mixed wastes as well as for food and yard wastes, which are amazingly consistent throughout the table.

In summary, national data from several sources support the values projected for southern California in Table 3. These values will be compared with data obtained from studies of MSW at specific locations in southern California in the next section, and projections regarding the MSW composition at Eagle Mountain will be made.

Waste Components and Moisture Contents - Southern California

Table 6 summarizes data from a variety of sources for southern California. These data were developed for different reasons and have different degrees of general applicability,

TABLE 4 - Seasonal Average Percentage Yard Waste in MSW (1970)

(Adopted from Wilson (1977))

	Seasonal Average, % wet wt.				Yearly Average, % wet wt.
	Summer	Spring	Winter	Fall	
Northern states	22.9	11.1	0.3	6.4	10.2
Middle states	12.2	9.5	–	1.6	–
Southern states	22.5	9.2	6.8	5.2	10.9

TABLE 5 - Average Composition of MSW in Summer (1970)

(Adopted from Wilson (1977))

	% wet wt.
Paper	31.0
Yard wastes	27.1
Food wastes	17.7
Glass	7.5
Metal	7.0
Wood	2.6
Textiles	1.8
Leather and rubber	1.1
Plastics	1.1
Miscellaneous	3.1

TABLE 6 - Southern California Municipal Solid Waste
Food and Yard Waste Concentrations*

(as provided through SCS Engineers, Long Beach, CA, and the Bureau of Sanitation, City of Los Angeles)

Location	Specific Conditions	% Food Wastes (wet wt.)	% Yard Wastes (wet wt.)	% H_2O (wet wt.)
City of Los Angeles (Lopez Landfill)	Fall	6.3	40.0	
	Winter	9.1	32.3	
	Spring	10.5	38.3	
	Summer	14.4	30.6	
	Calculated Ave.	10.1	35.3**	
City of Los Angeles (assumed)	Processible Waste	4.3	53.25**	26.25
City of Los Angeles	Residential	8.8	35.6	
	Commercial	4.3	4.1	
	Total Wastes	4.4	16.1	
Santa Barbara Co. (SCS)	Winter-Spring	3.3	35.9	
	Summer	7.5	28.5	
	Overall	5.4	32.2	
Pasadena (SCS)	Residential	3	38	
	Commerc./Indust.	nd	21	
	Total	2 (approx.)	32	
Glendale (SCS)	Residential	3	36	
	Commerc./Indust.	nd	20	
	Total	2 (approx.)	28	
Burbank (SCS)	Residential	3	37	
	Commerc./Indust.	nd	18	
	Total	2 (approx.)	28	
Los Angeles Co.		5.7	24.3	
San Diego Co.		7.0	23.3	
	Residential	6.5	25.4	
Orange Co.	Residential	8.1	28.6	
City of Los Angeles	Residential	8.8	35.6	
So. California	SCS drill cores***			20.4 (7.2-53.8)
Summary Projections	-average	6	30	21
	-range	2-10	24-36	10-40

* Unless specified otherwise

** Vegetation and wood

nd not determined

*** Average of 66 drill core samples from various landfills. Range for individual samples also shown. Range for

and so were interpreted accordingly in the summary entries at the bottom of the table. Some data refer to residential waste, some to commercial and industrial, and some to the total (including other small sources). Because the waste to be delivered to Eagle Mountain will most likely be mixed municipal waste, values reflecting this were emphasized in developing average summary figures at the bottom of Table 6, with the ranges likely to be observed within the various waste streams derived from different sources or routes. The data from Santa Barbara County and the Lopez Landfill support the assumption of the previous section that there is less seasonal variability in the study area than in the U.S. in general, and that significant amounts of yard waste are generated throughout the year.

Landfill moisture content values derived by SCS from drill core analyses obtained from various landfills are used here to help project MSW moisture contents. There is little MSW moisture content data specific to southern California so these values do supplement national data and data from the City of Los Angeles (Tables 3 and 6). Because the amount of rainfall entering the landfills is likely to be small, and some of this moisture taken up during wet periods is lost due to drying, there is expected to be little change in waste moisture content from generation as MSW to sampling as cores from the landfills. The landfills tested by SCS were not identified, so the likelihood of surface water run-on and runoff is not known. Diversion of rainfall from the landfills as runoff would improve the value of the SCS data to project waste moisture contents as generated, as the core moisture contents would more nearly correspond to the waste as generated. Surface water run-on from surrounding areas to the landfills tested by SCS would raise the moisture contents of the waste as measured by SCS above the moisture contents of the waste as generated, but run-on is unlikely in a well-designed landfill.

The projected averages for southern California refuse are 6% food waste (range 2 to 10), 30% yard waste (range 24-36), and 21% moisture, all on a wet weight basis (Table 6). The ranges reflect some seasonal effects, but, more importantly, the mix of residential and nonresidential wastes. Although the average moisture content is 21%, individually

mixed samples are likely to range from 10 to 40% based on the drill core range (excluding a few extreme samples). The values projected for the study area at the bottom of Table 3 (general U.S. figures) agree fairly well with the values shown at the bottom of Table 6. which were derived only from southern California studies.

Considering 6% of the MSW stream as food waste at a moisture content of 70% and 30% of the MSW stream as yard waste at a moisture content of 55%, food waste will contain an average of 4.2 lbs H_2O/100 lbs wet MSW, and yard waste will contain 16.5 lbs H_2O/100 lbs MSW. If the overall moisture content of MSW is 21%, food waste contributes 20% of the moisture, and yard waste 78%, leaving only 2% of the moisture in MSW to be provided by other waste components. This undoubtedly low value of 2% results from the overriding effect of moisture in yard wastes in particular. Wide fluctuations in the estimated moisture attributed to other components result depending upon the values used for the amount and moisture content of yard waste.

Other Factors Affecting the MSW Composition

The requirements of California AB 939 (the Recycling Bill) practically mandate that refuse be passed through a transfer/material recovery facility prior to the residue being transported to a landfill. Further, if the provisions of the Bill are to be achieved (25% waste diversion by 1995, 50% by 2000), yard or green waste will necessarily have to be removed. With the removal and separate processing of the yard waste, a substantial portion of the moisture will be diverted from the waste stream. It will be assumed in making projections from these waste composition figures that yard waste will be reduced by 50% through recycling (composting), but that no other changes will occur to materially affect the MSW composition delivered to the landfill. It is noted that recycling removes low moisture content items (glass, metal, plastic, paper), which are also items not likely to decompose at the landfill, so major changes in gas and leachate generation will be caused

by a reduction in yard and possibly food waste by composting, and not by recycling efforts.

Finally, there will be some drying of MSW during collection, transfer, processing, haul, and placement in the landfill. Considering the moisture contents of core drilling samples of landfilled waste were about the same as the projected average MSW moisture content, and 6% less than that obtained for processable waste (Table 6), and similar to that projected from general U.S. data (Table 3), it is difficult to conclude that there will be much change in moisture content at least until the material is discharged at the landfill working face. Alter (1983) indicates a 5% loss in moisture content of RDF as a result of densification, squeezing, heat from processing, and air-waste contact. It, therefore, seems reasonable to assume that a comparable 5% moisture loss could occur overall between the time of collection and placement and compaction in the landfill, dropping the final moisture content for the MSW as landfilled from 20 to 15%. It could be argued that more of the moisture loss will occur from paper than from yard or food waste, because of the difference in surface area and air-waste contact. Accordingly, this report will assume that no change in moisture content occurs for the critical components, namely, food and yard waste, and the moisture contents of these components in the landfill will be the same as concluded from Tables 1 through 6.

LANDFILL MOISTURE CONDITIONS

The purpose of this section is to evaluate the possibility and impact of any changes in the moisture content of the food and yard wastes once they are placed in the Eagle Mountain landfill. It was concluded in the previous section that food and yard wastes are the most likely MSW components to decompose as they contain not only the necessary decomposable materials but also the nutrients and moisture to support microbial processes.

Key elements that determine the amount of decomposition are moisture addition to the landfill, moisture loss from the landfill, and moisture movement and distribution of moisture levels within the landfill.

Moisture Additions to the Landfill

It will be assumed that there will be no groundwater-refuse contact at the Eagle Mountain landfill. Precipitation and water introduced with the waste are the only sources of water to the landfill. Moisture present in the waste was considered in the previous section. The Eagle Mountain area receives approximately three inches of rain per year and is hot and dry, with temperatures during the summer averaging 110°F. Most of the rain occurs during brief storms in the summer, when the potential for drying is maximized.

Any rain which falls directly on the landfill during operations would wet the uppermost layer or so, but even if all of the annual rainfall fell at once and did not evaporate, this is still only enough moisture to wet approximately 12 inches of refuse and bring it to field capacity. Field capacity is defined here as the moisture that can be held by refuse against the forces of gravity and capillary tension. The typical value used for estimation of the wetted front movement due to infiltration is 1 inch of infiltration per 3 to 4 inches of wetted front movement for typical MSW at typical densities in a landfill. Considering that the annual rainfall occurs over several events, with attendant evaporation between events, the actual amount of rainfall remaining in the refuse will advance the wetted front much less than the 12 inches and will therefore be insignificant for the landfill as a whole. There may be specific layers of refuse distributed throughout the landfill which may retain small amounts of moisture as a result of wetting during landfilling, but these layers will have an insignificant effect on gas production from the total landfill.

If all of the rainfall occurred in one event per year and there was no evaporation, assuming incoming refuse is placed in one huge 20 foot lift, the rain falling directly on the waste would bring only 5% of the waste to a moisture content approaching field capacity.

In other words, even under this extreme condition, only 5% of the waste would be affected by on-site rainfall. At the other extreme, if multiple lifts and well-drained cover prevents rainfall from contacting more than one day's active face of refuse, much less refuse would experience a moisture increase. A one-day supply of refuse is 1/313 of the yearly total, assuming 6 operating days per week. Under this scenario, 5% x 1/313 or 0.016% of the refuse would be brought to a moisture content adequate to easily initiate decomposition (near field capacity or 50% moisture on a wet weight basis).

Rain falling directly on the refuse at the landfill at Eagle Mountain will not be a significant source of moisture except in thin isolated layers distributed sporadically throughout the landfill. This source of moisture is insignificant compared to moisture introduced with the waste, specifically in the food and yard waste fractions.

Once the refuse is covered with soil, surface water hydrology and attendant effects describe moisture addition to the landfill via rainfall. The mechanism of water addition to the landfill is the same as that providing recharge to the groundwater in a non-landfill situation. There are models and methods for estimating recharge in wet climates, but these are questionable when applied to real-world situations, and even under straightforward, uncomplicated conditions, monthly predictions can vary from observed values by factors of 2 or more. In general, models do better in predicting average recharge rates over longer time periods--they do worse when trying to predict weekly or daily events.

Our understanding of groundwater recharge in arid areas is incomplete. Here, the major difficulty in predicting recharge is the lack of understanding of what happens in the vadose zone--the area between the bottom of the rooting zone and the water table. This zone is typically overlooked by both the surface water hydrology and the hydrogeology disciplines. Recharge in arid areas is highly variable--more so than in wet areas. Under similar arid climate and soil conditions, but with different plant cover and topography, the recharge can range from zero to more than the annual precipitation.

Flow through the vadose zone is difficult to define, especially under arid conditions. It is not subject to averaging in arid areas because there may be no flow for much of the year, yet suddenly a transient condition develops with considerable flow. Under some conditions, it is possible that all of this flow can lead to recharge, as evaporation is negligible in most of the vadose zone and transpiration may also be low to nonexistent depending on vegetation presence and root development. Flow through the vadose zone therefore varies with time, but it also varies spatially because of preferred paths of flow caused by surface topography (low points) and holes, cracks, and changes in hydraulic properties of soils within the zone. Flow in the vadose zone is characterized by transients and variability.

The most common method used to predict recharge and, hence, the amount of water eventually contacting refuse in a landfill, is the water balance. The water balance states that the amount of percolation or recharge is equal to the amount of precipitation less the amount of surface water runoff, evapotranspiration, and moisture uptake in the soil which is stored for later evapotranspiration. The latter term can be positive or negative depending on whether moisture is being stored (during wet periods) or released (during dry periods). A basic problem is that evapotranspiration is not predicted accurately under conditions where plant cover is sparse or where plants suffer seasonal water stress. When estimated by the water balance, recharge may be in error by an order of magnitude simply by unreliability of the measured or estimated precipitation and the actual evapotranspiration rate. Both numbers are small in an arid climate, so the difference is also small in absolute terms, with much inherent variability as a percentage of the difference. Even if it is assumed that seasonal soil moisture changes and runoff values are zero, uncertainty in precipitation (typically ± 5%) and evapotranspiration (say ± 10%) result in recharge estimates varying ± 100% or more. EPA's HELP model is widely used to predict leachate flows (recharge rates), but it is not useful under such extreme conditions as at Eagle Mountain.

A recent paper from South Africa by Blight et al. (1990) reports that water balance calculations performed at a landfill receiving 20 inches of precipitation per year predicted leachate flow at 39% of precipitation, and that monitoring within the landfill confirmed that leachate was being produced. The authors cite a paper by Keenan (1986) which predicts that if precipitation is less than 12.8 inches/year (325 mm), leachate will not be produced. They also cite a paper by Saxton (1983) which gives a figure of 15-25 inches (400 mm)/year as the boundary.

In the absence of monitoring the actual site of concern, the best data predicting recharge in arid climates have been obtained from lysimeters. Lysimeters must model the actual site, they must be big and deep, and they must be monitored over an extended period of time, especially when so much of the flow occurs over a short period of the year. The initial state of the lysimeter soil with respect to moisture content and distribution of moisture is critical to modeling real-world situations.

Lysimeters constructed in eastern Washington state, at Hanford, gave measured recharge rates ranging from zero to more than the precipitation depending on soil type and plant cover (Gee and Hillel (1988)). The average precipitation is 6 inches or 16 cm/year. For nonvegetated lysimeters, differences in recharge rates were attributed to differences in snow accumulation and snow melt, and initial soil moisture content. Soils that were relatively dry at the beginning of a precipitation event allowed less recharge at the bottom of the lysimeters, but once sufficient water had accumulated, they passed water downward like similar lysimeters that were initially wetter. Only slight changes in vegetation were found to be important in affecting recharge.

Jones and Skaggs (1989) describe a set of 9 foot lysimeters constructed at Hanford in 1984. Excluding initial data from lysimeters placed especially dry (which therefore had little recharge or drainage at first) for the year 9/84 through 8/85, of the 13.8 cm of precipitation, an average of 7.5 cm was evaporated and drainage averaged 4.2 cm. For the year 9/85 through 8/86, 21.7 cm of precipitation resulted in an average of 10 cm of

evaporation and 12.3 cm of drainage. It is noted that a significant amount of the precipitation occurs at Hanford as snowfall, which quickly entered the soil as snow melt upon thaw when evaporation was low. This is, therefore, a different situation than at Eagle Mountain, where such snowfall will not occur. The 30 to 50% of precipitation resulting in drainage measured at Hanford is expected to be much higher than will be experienced at Eagle Mountain.

Gee and Jones (1985) summarize the several sets of lysimeters constructed at Hanford to that time. They indicate that estimates of recharge to the water table range from zero to 8.5 cm/year, depending on the exact soil, plant, and climate condition for each lysimeter. They also provided estimates of recharge at other arid sites, as summarized in Table 7, taken directly from their report. The driest climate listed in the table is Saudi Arabia at 8 cm/year, which is comparable to that at Eagle Mountain, both with regard to precipitation and most likely temperatures (no freezing conditions or snow). Recharge was estimated at 25% or 2 cm/year using a tracer technique at Saudi Arabia. The exact figure at Eagle Mountain will depend on soil conditions, drainage, rainfall patterns, etc., but even at 25% of precipitation, recharge of 2 cm/year will be insignificant in changing the moisture content of the MSW or promoting moisture flow.

It is concluded from the above discussion and general experience in using water balances that no significant recharge or percolation will occur at the Eagle Mountain landfill. This is based on the assumption that off-site surface water will be diverted from the landfill and that the site will be sloped and provided with surface water collection systems to avoid ponding of water on-site. It is also assumed that reasonable care will be given to construct good cover, free of cracks, crevices, holes, etc., which, if located in a drainage area could transmit locally significant amounts of water into the landfill. Finally, it is assumed that cohesive, low permeability cover soils will be used for final cover and for any intermediate cover exposed for more than a few years. It is unlikely that recharge would occur with only 3 inches/year of precipitation, especially when one considers the

TABLE 7 - Reported Estimates of Recharge at Selected Arid Sites
(from Gee and Jones (1985))

Source	Location	Method	Annual Precipitation (cm)	Estimated Recharge (cm)	Recharge as % of Precipitation
Enfield, Hsieh and Warrick (1973)	Hanford Site (200 Area)	Darcy flux	16	<1	<6
Brownell et al. (1975)	(200 Area)	Neutron probe	16	0	0
Jones (1978)	(200 Area)	Neutron probe	16	<0.5	<3
Gee and Kirkham (1984)	(300 Area)	Neutron probe and lysimeter	28	6	21
Dincer, Al-Mugrin and Zimmerman (1974)	Saudia Arabia	Tritium tracer	8	2	25
Sammis, Evans and Warrick (1982)	Arizona	Darcy flux, tritium, temperature profile	100-150(a)	22	15 to 22
Allison, Stone and Hughes (1985)	Australia	Chloride tracer	30	1.4	5
Stephens (1985)	New Mexico	Darcy flux	18	4	22
Narasimhan, White and Tokunaga (1985)	Wyoming	Darcy flux	22	2.1	10

(a) Includes irrigation.

extensive amount of run-off and evaporation to be experienced at the Eagle Mountain site. If any recharge were to occur, because, for example, landfill surface contours allowed accumulation of runoff on site, it is observed that moisture flow downward will also be localized and will not apply to the landfill as a whole.

Moisures Losses from Within the Landfill

The first mechanism for moisture loss from within the landfill to be considered is evaporation of moisture from the refuse into the void spaces followed by diffusion and/or convective flow to the atmosphere. Assuming that water exerts its full vapor pressure in the refuse (mole fraction of water in leachate is essentially 1) and that the pressure in the landfill is one atmosphere, the mole fraction of water vapor in the void space is equal to the vapor pressure as a fraction of one atmosphere. To the extent the mole fraction of water vapor is basically zero in the atmospheric air, the change in water vapor concentration becomes the driving force for diffusion acting over some unknown thickness of cover and refuse at the surface of the landfill. Since there are no known measurements of water vapor concentrations at different depths in a landfill from the cover-atmosphere boundary, the flux will vary greatly depending on the distance over which the concentration gradient operates, even for a given value of the diffusion coefficient.

Diffusion of gas through a porous solid must take into account the available cross-sectional area and the effective path length which the molecules are required to travel. Based on Fick's Law, the diffusion of water vapor through porous solids can be described by the following equations (Baver et al. (1972)):

$$\frac{dq}{dt} = \frac{D_o A S (p_1 - p_2)}{l_e \quad \beta} = \frac{DA (p_1 - p_2)}{l \quad \beta}$$

where dq is the molar flow diffusing over time dt through area A. D_o is the coefficient of diffusion in air, D is the effective diffusion constant, S is the porosity of the solid, l_e is the

effective path length, and p_1 and p_2 are the partial pressures of the vapor on each side of length l of the solids.

A study of diffusion rates, as reported in Baver et al. (1972), showed that $D/D_o = 0.66S$. Using this relationship, the diffusion constant of water vapor in air at 0.275 cm^2/s, a soil porosity of 0.2, and a 10 foot depth over which the concentration of water vapor changes from saturation to zero (for zero humidity), the diffusion of water vapor from the landfill would amount to less than 50 lb/acre·day. Assuming a 150 foot depth of MSW at 1250 lb/yd^3, this represents an annual loss of about 0.025% of the water originally contained in the refuse--a negligible amount. Considering the size of the Eagle Mountain landfill and the fact that much of the landfill is below grade so that exposure to the atmosphere is minimized, it is assumed that the loss of moisture by this mechanism is negligible in comparison with the reservoir of moisture available in the MSW.

The second mechanism for moisture loss relates to decomposition of the MSW. This includes moisture taken up during decomposition plus moisture loss resulting from saturation of gases generated during decomposition leaving the landfill. Complete decomposition of organic matter to methane and CO_2 can theoretically produce as much gas as modeled by the following equation (Tchobanoglous et al., (1977)):

$$C_aH_bO_cN_d + \left(\frac{4a-b-2c-3d}{4}\right)H_2O \rightarrow \left(\frac{4a-b+2c+3d}{8}\right)CO_2 + \left(\frac{4a+b-2c-3d}{8}\right)CH_4 + dNH_3$$

Conversion will not be 100% efficient as modeled by this equation, but for purposes of estimation, it will be assumed that methanogenic decomposition is efficient and will at least approach the calculated values. Using the chemical composition of yard waste (grass, brush, greens, and leaves) and food wastes (garbage and fats) from the Purdue study (Corey (1969)), dry yard waste contains 41.6% C, 5.94% H, 4.26% O, and 1.21% N, and dry food waste contains 58.2% C, 8.77% H, 21.5% O, and 1.93% N. One pound of dry yard waste would take up 0.129 lb water and produce 12.44 ft^3 of gas at 51.3% CH_4 and 48.7% CO_2 for complete decomposition according to the above equation. One pound

of dry food waste would take up 0.376 lb water and produce 17.4 ft^3 of gas at 64.6% CH_4 and 35.4% CO_2. It is assumed that no more than one-half of this "complete" decomposition could actually occur. This is based on the amount of gas produced under close to ideal circumstances attributable to MSW in MSW-sewage sludge anaerobic digesters compared with the gas potential of the MSW as calculated by the above equation. The result is that up to 0.0644 lb water will be taken up during decomposition per pound of dry yard waste, and 6.22 ft^3 of gas will be evolved. One pound of dry food waste will take up to 0.188 lb water and evolve 8.7 ft^3 of gas.

It was previously estimated that the waste entering the landfill would average 6% food waste at 70% moisture and 30% yard waste at 55% moisture. Using 100 lb incoming MSW as a basis and assuming only 50% of the food and yard wastes are decomposed, a total of 1.21 lb water will be taken up during decomposition and 99.6 ft^3 gas of composition 53.4% methane and 46.6% CO_2 will be produced. This amounts to a total of approximately 6% of the initial moisture content of the waste as received (assumed at 21%), which will be lost due to decomposition. Given the uncertainty of gas generation rates under the dry landfill conditions, this moisture loss is considered to have negligible impact on the landfill.

At 40°C, the vapor pressure of water is 55 mm Hg and for basically pure liquid water in equilibrium with the water vapor in the gas in the landfill, the 99.6 ft^3 dry landfill gas generated will carry 7.8 ft^3 water vapor or 0.39 lb water. This represents a loss of 1.9% of the 21 pounds of water contained in the 100 pounds of incoming MSW, which is also concluded to be insignificant.

Moisture Movement and Distribution

Moisture movement has been shown to increase MSW decomposition rates as measured by methane gas generation as well as by other indicators of decomposition such as loss of solid matter (cellulose in particular) and leachate composition.

Numerous researchers since the early 1970s have observed that moisture movement, as obtained by leachate recycling, promotes refuse decomposition in a landfill. Most observations were under somewhat artificial circumstances, usually in a laboratory setting with controlled conditions, using selected shredded MSW with large amounts of moisture available. Explanations are now available to understand those cases where leachate recycling did not promote decomposition. The most common reasons for limited methane formation relate to acid souring of the MSW, usually by promoting rapid initial decomposition of readily decomposable sugars and starches which resulted in acidic degradation products (especially organic acids). If the leachate was neutralized prior to recycling, methane generation was enhanced, further indicating that leachate recycling does promote decomposition. There is yet no documented full-scale landfill test proving the effect of leachate recycling in a situation typical of sanitary landfill practice.

Leachate recycling can promote decomposition by increasing moisture movement, increasing the moisture content, and/or by attendant movement of nutrients, substrate, and decomposition products. Assuming that leachate flow is primarily within refuse particles, as opposed to channels or void space between refuse particles, in order to have leachate flow the refuse would have to soak up close to the amount of moisture that can be held against gravity and capillary forces (field capacity) so that excess moisture can pass downward to be collected and eventually recycled as leachate. In other words, the refuse moisture content must be high which in itself promotes decomposition. Further, refuse decomposition involves many different types or groups of microorganisms working together to eventually produce methane and CO_2, which underscores the need for transport of microorganisms or substrate, nutrients, and decomposition products specific to each microorganism. There are, therefore, several mechanisms by which leachate recycling accelerates decomposition rates.

Most of the research on leachate recycling has used shredded refuse, which would promote moisture flow within refuse particles and not in voids between particles, as

discussed in the previous paragraph. This is also one of the reasons why leachate recycling has worked so well. Shredded refuse in itself decomposes more rapidly because of the mixing of waste components and the increased particle surface area.

Results of leachate recycling with unprocessed or raw refuse have not been as dramatic, in part because of particle size and mixing (i.e., telephone books versus small paper particles distributed throughout a volume of mixed refuse), but also because of increased moisture flow through voids or channels between refuse particles. Depending on the degree of compaction and the composition of the waste, channel flow may be very high, lowering the benefits of leachate recycling proportionately. Baled refuse has been demonstrated to decompose more slowly, and channel flow of moisture is the primary reason. Refuse containing demolition debris or brush will have more channel flow. Channel flow is responsible for the common arrival of leachate at the bottom of a landfill long before field capacity or wetting of the refuse mass to its moisture holding capacity is attained.

There has been some research performed evaluating separately the factors involved in most leachate recycling experiments. The effect of shredding alone is well documented (e.g., Bookter and Ham, 1982), as is the effect of refuse moisture content (next section). The only research known to have addressed moisture movement separately from moisture content is that of Klink and Ham (1982), in which refuse taken from full-size landfills known to be producing methane was placed in cylinders approximately 3 feet long by 6 inches in diameter. Once consistent methane generation rates were established, different amounts of moisture were added, leachate was recycled or not, and moisture movement was promoted or not as separate variables. The latter was done by inverting the cylinder frequently and regularly so no leachate was allowed to accumulate at one end or the other of the cylinders. In this way, moisture levels above field capacity could be evaluated without promoting overall leachate flow. By stopping the cylinders in a vertical position, leachate flow occurred and leachate reaching the bottom was immediately recirculated to the top, in

effect maintaining the same overall refuse moisture content but adding moisture flow as a relatively independent variable. This work showed that methane generation rates were increased by 25 to 50% at basically the same moisture contents (necessarily above field capacity) by moisture flow alone.

The point in the above discussion is not so much to show that low moisture contents alone retard decomposition, for this will be considered more carefully later, but to emphasize the importance of moisture flow in promoting decomposition. In the absence of moisture flow, distribution of moisture as well as soluble substrates, nutrients, trace metals and microorganisms throughout the landfill is severely limited. Minor amounts of flow of specific substances will occur by diffusion, but this will be over short distances and take much time. Some moisture flow will occur due to capillary flow or wicking to wet components such as paper, but, both the amount of flow and the distance over which it occurs are expected to be small. The landfill becomes stratified, with refuse components continuing indefinitely at much the same moisture content, nutrient level, etc., as was present at placement. Because of this stratification, it is argued that only refuse components entering the landfill which themselves contain the necessary moisture, substrate and nutrients will decompose, essentially eliminating paper decomposition. The materials most likely to decompose are food and yard wastes, and decomposition of even these materials will be limited by their moisture contents, nutrient levels, etc., at the time of placement.

The concept of stratification of moisture levels and the extent of decomposition in landfills has been widely observed during the excavation of landfills for construction purposes, for gas or leachate withdrawal, and for archaeological investigations. Defined zones of widely different moisture contents have been observed at landfills many years old; green grass, readable paper, and even food scraps have been seen in landfills known to be decomposing to some degree because of methane production. The degree of stratification ranges from basically complete stratification in landfills in dry climates, some of which

have been excavated many years after landfilling, to virtually no stratificaton in shredded refuse landfills in wet climates. The latter has been tested observed in test landfill cells, not in full-scale landfills. Even in wet climates, some stratification occurs due to nonuniform moisture flow and distribution within the landfill which is caused by voids and by layers of materials of markedly different hydraulic properties (such as cover soils, brush, etc.).

Summary of the Landfill Moisture Situation

This section has emphasized the stratification of moisture levels within the landfill, with materials in the landfill maintaining basically the same moisture contents indefinitely at which they were placed. The lack of moisture flow into the landfill in the arid climate of the Eagle Mountain site means little movement of water within the landfill. This in turn means little redistribution or homogenization of moisture contents within the landfill. The lack of moisture movement also means lower decomposition rates. Finally, it was concluded that little moisture would be added to the waste once it is placed in the landfill and that minor amounts of moisture would be lost due to decomposition processes or to evaporation of water within the landfill.

REFUSE DECOMPOSITION AT LOW MOISTURE CONTENT LEVELS

Many studies have reported on the effect of moisture content on refuse decomposition, but the results are often contradictory or at least do not reinforce each other. This is because of variable refuse composition and biological situations at the beginning of observations, the use of different control variables and variables affecting the onset of methane formation, and the output data utilized to draw conclusions. For example, most studies start with freshly shredded MSW, but others have used raw unprocessed MSW, waste of unusual composition, or samples from full-scale landfills in some cases known to

be generating methane. Some researchers have let the refuse decompose on its own; others have used moisture addition, buffer addition, biological seed addition, nutrient addition, refuse diluents, preprocessed refuse, and leachate recycling. Finally, researchers have reported their observations based on total gas generation, methane concentration, or methane generation.

Clearly, methane generation is the best measurement to describe biological activity in most landfills, but this is the most difficult to measure accurately, and inadequate laboratory procedures are highlighted with this as the measured output. Reasonable methane generation rates are difficult to achieve in laboratory or field test cells.

No studies have been reported in the literature which attempted to model the effect of moisture on the decomposition of MSW at low moisture levels (< 20%). On the other hand, several researchers have reported empirical models which were used to describe the effect of moisture on the decomposition of natural materials such as grass litter, leaf litter, and tundra. These models may be useful for understanding moisture effects on the decomposition of yard wastes which are considered to be the largest decomposable fraction of MSW under the conditions expected at Eagle Mountain.

Temperature and moisture content have been described as the primary factors controlling decomposition rates. Work by Wildung et al. (1975) shows that the moisture content of arid grassland soils strongly affects the decomposition of grass litter at temperatures above 15°C. At temperatures greater than the 24°C, the results showed a significant increase in decomposition as moisture contents were increased from 5 to 20%.

In another extreme environment, Heal and French (1974) studied the effect of moisture content on the decomposition of tundra. They developed a nonlinear model which described the effect of both temperature and moisture on a weight loss basis as follows:

$$Y = 11.62 + 0.0147 \cdot T \cdot W^2 + 0.00152 \cdot T \cdot W^3$$

where: Y = percent mass loss (day^{-1})

T = temperature sum ($^{\circ}day > 0^{\circ}$)

W = soil moisture (percent of dry mass)

With an expected temperature of about 45°C within the Eagle Mountain landfill, this model shows approximately a 50% drop in the rate of decomposition for each 10% decrease in moisture from approximately 60 to 30%. However, as the moisture content falls below 30%, decomposition becomes much more sensitive to the moisture content and reduces to basically zero at moisture contents below 10%. This is the same trend shown by Wildung et al. (1975).

Most of the published results from studies concerning the effect of moisture on the decomposition of solid wastes involved moisture contents greater than 30%. Very little information is available in the literature for MSW decomposition at moisture levels below 30%. In a study concerning the aerobic decomposition of MSW, Golueke (1977) stated that "biological activity ceases at a moisture content of about 12%" and that as the moisture level decreases towards this level, the rate of microbiological activity becomes more retarded. In another study concerning the effect of moisture, Mandeville (1976) stated that "the anaerobic process is virtually nonexistent or occurs at a very slow rate when the moisture content falls below 25%." Unfortunately, neither work reported how these figures were derived.

Wilson (1977) reported that the limiting moisture content for bacterial activity was around 12 to 15% for composting. Hartz and Carlson (1973) indicate that there is no aerobic decomposition of MSW at less than 10% moisture. Doedens and Cord-Landwehr (1989) indicate that a moisture content greater than 30% is essential for satisfactory methane generation.

Christensen and Kjeldsen (1989), in a review of biochemical processes in landfills, summarize data from Rees (1980) describing an exponential effect of moisture content on gas generation over the range 25 to 60% moisture. The plot of data reproduced here as

Figure 1, indicates a sharp drop in gas production rate from MSW in laboratory experiments with decreasing moisture content, projected to be zero at less than 20 to 25% moisture.

Hartz and Ham (1983) placed samples of refuse from full-size landfills in gas-tight cylinders and monitored methane generation. After a period of monitoring, moisture was added to samples not producing methane. After additional monitoring to obtain consistent gas generation rates without leachate recirculation, leachate was recirculated. The data are summarized in Figure 2, which indicates a clear drop in methane generation rate at lower moisture content levels over a range of 22.9 to 46.2% without leachate recirculation. Assuming extension of the line is valid, the methane generation rate would be projected to be zero at approximately 10% moisture. With leachate recirculation, the moisture content was necessarily at least at field capacity and so ranged from an average of 41.5 to 60.9%. There was a sharp increase in methane generation rate with increasing moisture content with leachate recirculation.

Barlaz (1988) cites Emberton (1986) who took multiple samples from ten full-scale landfills, placed them in containers, and monitored gas composition and production for one year. The results, given in Figure 3, indicate the general trend to lower gas generation rates at lower moisture contents, but also indicate all samples produced some gas even at moisture contents as low as approximately 10%. It is assumed that gas measured is methane plus CO_2 and that samples were in fact producing both gases, as suggested in the description of the experiment and in the discussion of the results.

In reviewing the various data sources and comments by the various authors presented thus far, there appears at first to be a contradiction, with some writers concluding that there is no gas generation at moisture contents on the order of 10 to 15% or lower, and others projecting no gas generation below approximately 20% moisture content, and one writer measuring gas from several samples at moisture contents ranging from 10 to 20%. It is

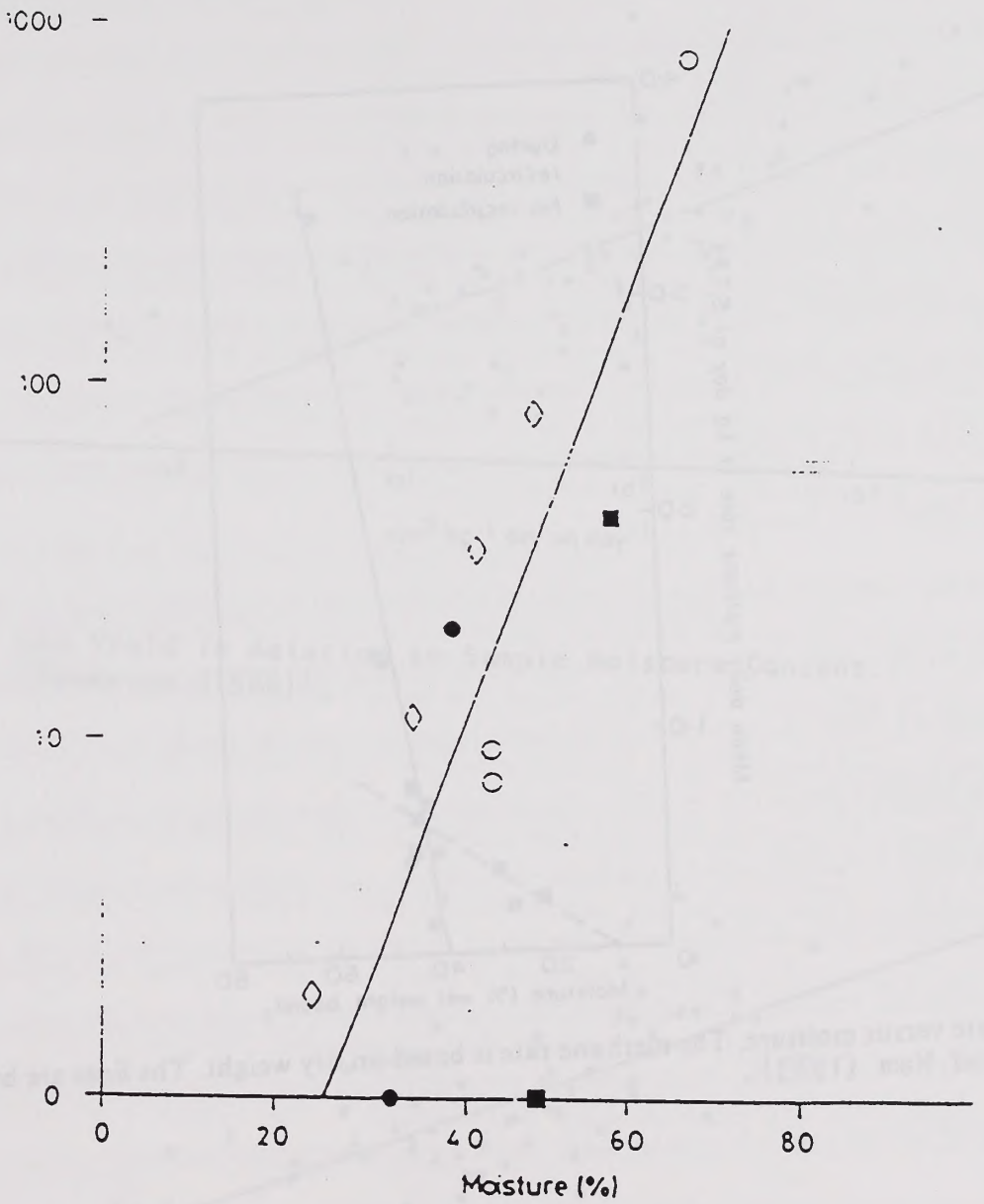


Figure 1. Gas generation rates as a function of moisture content of refuse in different laboratory samples (Rees (1980)).

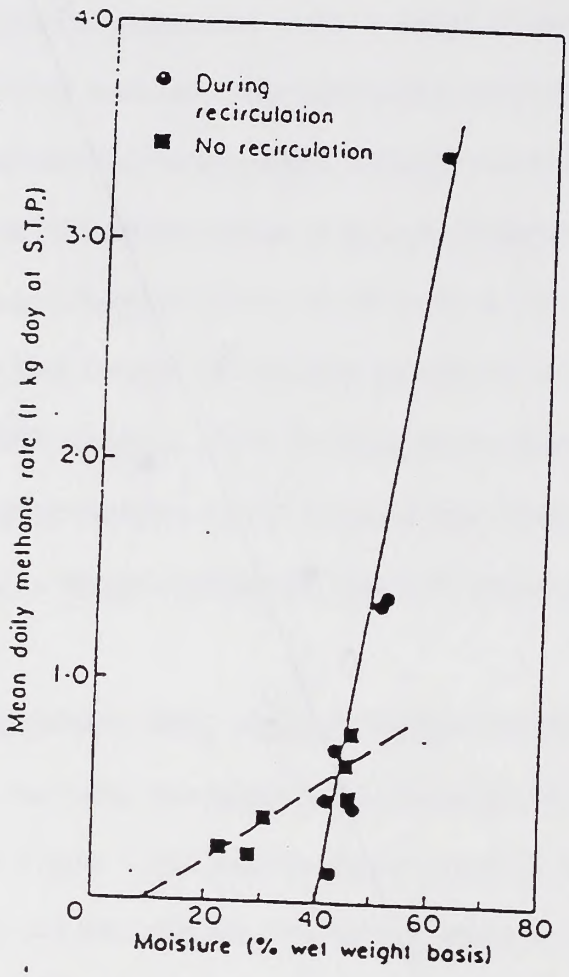


Fig. 2. Methane rate versus moisture. The methane rate is based on dry weight. The lines are by least squares. (Hartz and Ham (1983).

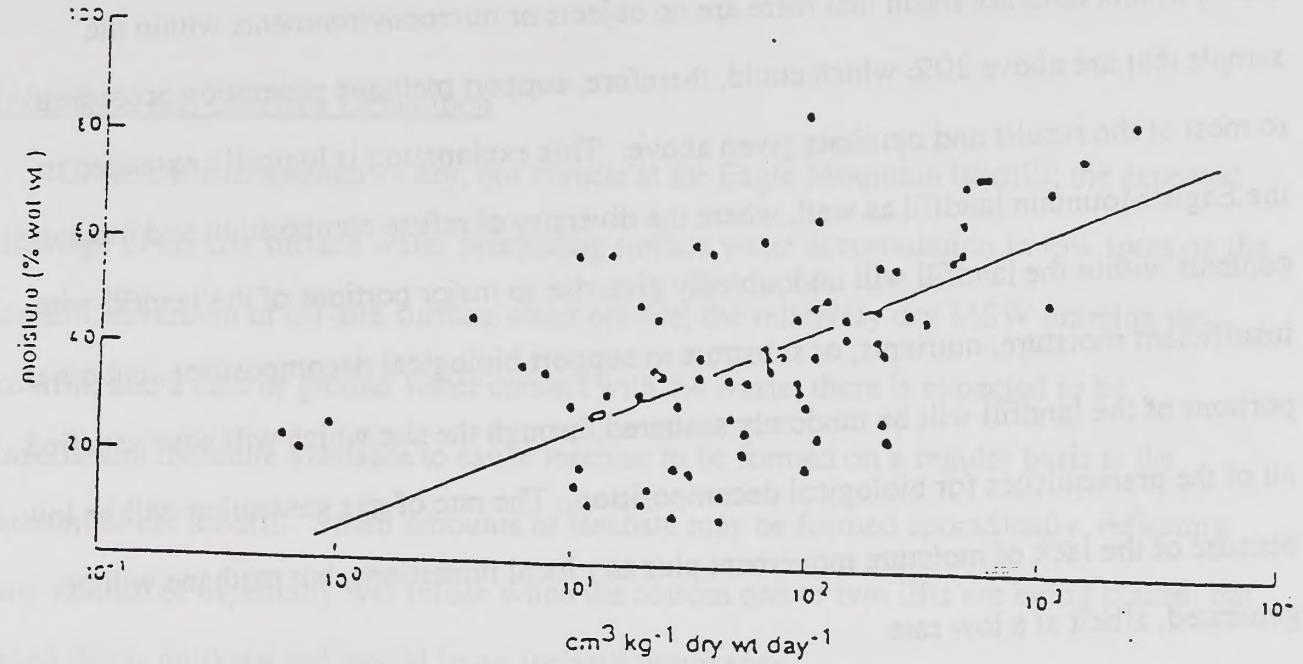


Figure 3a. Gas Yield in Relation to Sample Moisture Content. (Emberton (1986)).

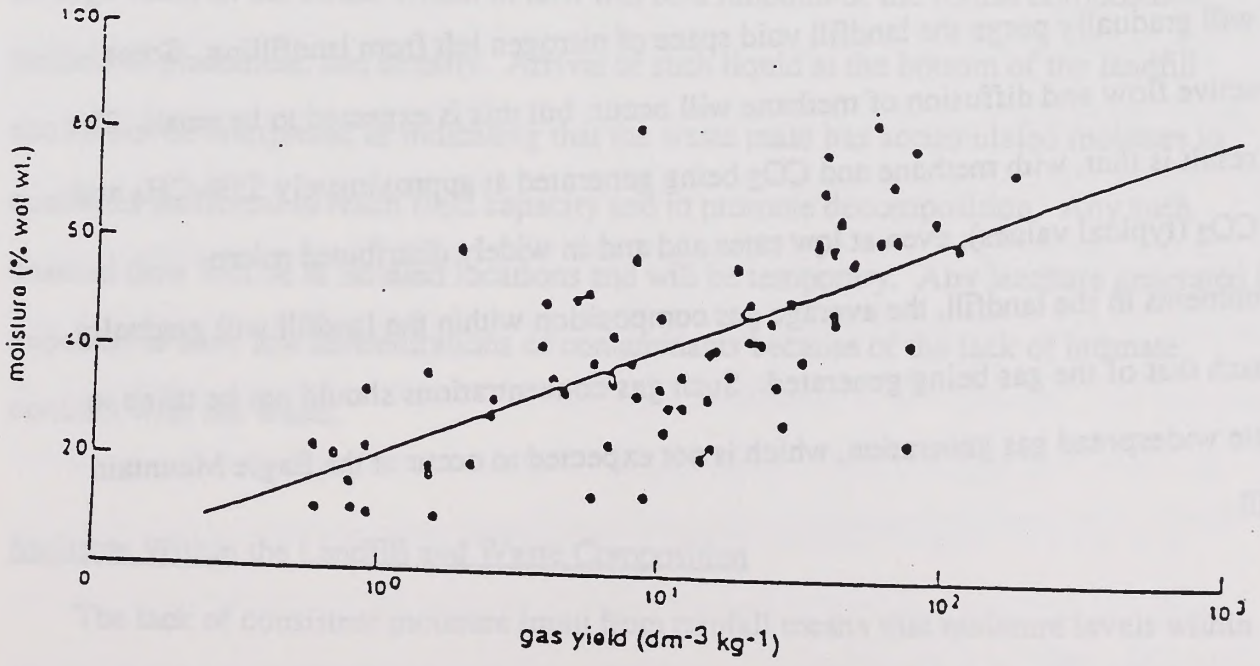


Figure 3b. Maximum Rate of Gas Production in Relation to Sample Moisture Content. (Emberton (1986)).

likely that the nonhomogeneous nature of refuse and landfills is the reason for this apparent discrepancy. If the overall moisture content of a refuse sample is given as 10%, for example, this does not mean that there are no objects or microenvironments within the sample that are above 20% which could, therefore, support methane generation according to most of the results and opinions given above. This explanation is logically extended to the Eagle Mountain landfill as well, where the diversity of refuse composition and moisture contents within the landfill will undoubtedly give rise to major portions of the landfill with insufficient moisture, nutrients, or substrate to support biological decomposition, but other portions of the landfill will be randomly scattered through the site which will have satisfied all of the prerequisites for biological decomposition. The rate of gas generation will be low because of the lack of moisture movement plus any local limitations, but methane will be generated, albeit at a low rate.

The result will be a buildup of methane concentration in the void spaces of the landfill. This must not be taken, however, as evidence of substantial decomposition. Given the lack of movement of other gases to purge methane from the landfill, methane will accumulate. This will gradually purge the landfill void space of nitrogen left from landfilling. Some convective flow and diffusion of methane will occur, but this is expected to be small. The final result is that, with methane and CO_2 being generated at approximately 55% CH_4 and 45% CO_2 (typical values), even at low rates and and in widely distributed micro-environments in the landfill, the average gas composition within the landfill will gradually approach that of the gas being generated. Such gas concentrations should not be taken to indicate widespread gas generation, which is not expected to occur at the Eagle Mountain landfill.

SUMMARY AND PROJECTIONS OF LFG AND LEACHATE GENERATION AT EAGLE MOUNTAIN

Infiltration and Leachate Generation

Given the extraordinarily dry, hot climate at the Eagle Mountain landfill; the expected drainage of on-site surface water precluding surface water accumulation in low spots on the landfill; diversion of off-site surface water off-site; the relatively dry MSW entering the landfill; and a lack of ground water contact with the waste; there is expected to be insufficient moisture available to cause leachate to be formed on a regular basis at the bottom of the landfill. Small amounts of leachate may be formed sporadically, reflecting any rainfall or especially wet refuse when the bottom one or two lifts are being placed, but even this is unlikely and would be an isolated occurrence.

Except for rain falling directly on the liner at the bottom of the landfill prior to refuse being placed, any liquid reaching the bottom will be as a result of channeling or flow through voids in the refuse which in turn will be a function of the refuse composition, method of placement, and density. Arrival of such liquid at the bottom of the landfill should not be interpreted as indicating that the waste mass has accumulated moisture in quantities sufficient to reach field capacity and to promote decomposition. Any such channel flow will be in isolated locations and will be temporary. Any leachate generated is expected to have low concentrations of contaminants because of the lack of intimate contract with the waste.

Moisture Within the Landfill and Waste Composition

The lack of consistent moisture input from rainfall means that moisture levels within the waste will be determined by the moisture content of the waste at the time of landfilling. Potentially degradable MSW components most likely to contain moisture at levels sufficient to sustain biological decomposition are food and yard wastes. Food waste is expected to

be 6% (range 2-10%) of the MSW and contain 70% H_2O (range 50-80%) wet weight. Yard waste is expected to be 30% (range 24-36%) of the MSW and contain 55% H_2O (range 30-80%) wet weight. For an overall MSW moisture content of 21%, food and yard waste will contain 21% and 78% of this moisture, respectively, using the average values.

Assuming a 50% reduction of yard wastes due to composting, for example, and no other changes in waste composition, the waste will average 7% food wastes and 17.6% yard waste, which will contain 33 and 66%, respectively, of the moisture in the mixed waste which will then be 15% on a wet weight basis. It is noted that recycling of paper, metal, glass, and plastics will change the waste flow, but not the net result as far as this analysis is concerned. These recyclable components are marginally or not degradable (metal, glass, plastics) or are potentially degradable but will not degrade at Eagle Mountain because of the dry conditions and their low initial moisture contents (paper). The input rate to the landfill of food and yard waste remains the same even though the percentages of these materials in the incoming waste change.

Moisture will be distributed throughout the landfill randomly according to where the different components of MSW are placed. Higher moisture contents will occur where food and yard wastes happen to have been placed; lower values will occur where paper, wood, miscellaneous inorganics, plastics, glass, etc., have been placed. Further, from the relatively dry characteristics of the waste and the lack of moisture flow from surface infiltration and percolation, there will be insignificant movement of moisture from one location to another and little homogenization of moisture levels throughout the landfill. This will leave the landfill stratified with respect to not only decomposable matter but also with respect to the moisture necessary to support decomposition.

Decomposition and Gas Generation

There is little information available in literature on MSW decomposition in landfills at low moisture content levels. The marked drop in decomposition rate with lower moisture

levels over the range of 20 to 60% H_2O is well documented; however, depending on the author and the basis for the conclusion, the effect of moisture contents below 20% is less certain. It is clear that decomposition rates at less than 20% H_2O are very low, and some references indicate that the rate is essentially zero at less than 10 to 15% H_2O. Given this information plus the lack of moisture flow at Eagle Mountain, it is concluded that food and yard wastes are the most likely components to decompose.

Stratification of the landfill with respect to both degradable matter and moisture will result in isolated pockets of biological decomposition scattered throughout the landfill. Some decomposition of food and yard waste will occur, but little else for lack of moisture, substrate, or nutrients to promote decomposition. The lack of moisture flow is critical in limiting decomposition, because even in a microenvironment which has adequate substrate or nutrients to promote decomposition, a buildup of partial degradation products or a lack of nutrient supply, both of which could be alleviated by moisture flow, will minimize or preclude decomposition.

Assuming that the food and yard wastes are eventually 50% decomposed, MSW containing 6% food waste at 70% moisture and 30% yard waste at 55% moisture will theoretically produce a total of 99.6 ft^3 of dry landfill gas of average composition 53.4% methane and 46.6% CO_2 (plus trace components) per 100 pounds of entering MSW. If it is assumed that this gas is produced at a constant rate over a 30 year period, the rate per 100 lb MSW would be 3.3 ft^3/year. This time period has been used elsewhere to estimate the decomposition period or period of active gas generation in dry climates. It is based on limited evaluation of gas production rates, compared with the calculated gas generation potential, and on mass balance considerations for the incoming waste. The use of a constant rate reflects the limitation imposed by the lack of moisture and moisture flow, which limits the rate of decomposition to materials availability and transport--not to biological kinetics which typically follow a first order kinetic relationship. It is noted that over the period of operations at the Eagle Mountain landfill, which is to be many years, it is

immaterial whether a first order or zeroth order (constant rate) kinetic model is used if the MSW input rate is the same per year because the gas generated per year is the same for the total landfill.

If the MSW composition changes because of a 50% reduction in yard wastes, 67.4 ft^3 of gas will be produced per 100 lbs MSW at a composition of 54.9% CH_4 and 45.1% CO_2. Over a 30-year life, this amounts to 2.2 ft^3/year per 100 lbs MSW.

These gas generation projections must be interpreted as likely maxima. Uncertainties exist in waste composition; waste moisture content; the effect of climate in adding to or removing moisture from the waste during storage, transfer, haul, and landfilling; input or removal of moisture at the landfill; and the degree to which decomposition and methane formation actually occur at the landfill. The last issue is of special importance as decomposition may be virtually nonexistent or may produce materials other than just methane and CO_2 (partial degradation products such as acetate and hydrogen, for example). The estimates are, however, based on available information and experience.

The final issue is gas composition regarding trace or minor gas components. Given the lack of moisture and the resulting stratification of and slow rates of decomposition, it is considered unlikely that significant amounts of gases other than CO_2 and CH_4 will result from decomposition processes. Considering the lack of gas generation to purge gases from the landfill, however, there may be measurable concentrations of hydrogen and other gases. If mature methanogenic decomposition occurs, with all of the necessary groups of microorganisms active in proper proportion, there will be no measurable hydrogen. However, under the conditions expected at Eagle Mountain, it is unlikely such a balanced biological system will be established, and measurable hydrogen will result. Concentrations up to 5% hydrogen are not unusual in some landfills, but values closer to 1% are more common.

Trace or minor organic gases are likely to arise by simple evaporation of waste components in the landfill. MSW unavoidably contains solvents, as from paints, thinners,

degreasers, dry cleaning, etc., which will volatilize. Given the lack of vigorous gas generation, only small amounts of such evaporation will result in measurable amounts of minor gas components being measured on a concentration basis. There is little to no dilution by landfill gas, and little to no purging of these gases by virtue of overall gas flow. Gaseous aromatic and chlorinated solvents are the most likely to be observed. Vinyl chloride, which is commonly found at low concentrations in landfill gas, arises from biological degradation of chlorinated solvents. Since little biological decomposition is anticipated, and since that which occurs is likely to be localized, it is expected that little vinyl chloride will be observed from biological activity. It is unknown whether measurable vinyl chloride will result from other sources, but even if it occurs it should be in small amounts.

REFERENCES

Alter, H., Materials Recovery from Municipal Waste, Marcel-Decker, Inc., New York, New York, p. 203, (1983).

Bagchi, A., Design, Construction, and Monitoring of Sanitary Landfill, Wiley-Interscience, New York, New York, p. 50, (1990).

Barlaz, M., Microbiological and Chemical Dynamics During Refuse Decomposition in a Simulated Sanitary Landfill, Ph.D. Thesis, University of Wisconsin, Madison, (1988).

Baver, L. D., Gardner, W. H., and W. R. Gardner, Soil Physics, John Wiley and Sons, Inc., New York, pp. 235-237, (1972).

Blight, G. E., Hojem, D. J., and J. M. Ball, "Generation of Leachate from Landfills in Water-Deficient Areas," Proceedings: Methane from Landfill Summer School, Rhodes University, Chemistry Department, Grahamstown, So. Africa, (January 29-31, 1990).

Bookter, T. J. and R. K. Ham, "Stabilization of Solid Waste in Landfills," ASCE, Journ. Ev. Eng. Div., 108, 1089-1100 (1982).

Christensen, T. H. and P. Kjeldsen, "Basic Biochemical Processes in Landfills," in Sanitary Landfilling: Process, Technology, and Environmental Impact, Christensen, Cassu, and Stegmann, Eds., Academic Press Inc., San Diego, CA, p. 29-49, (1989).

Corey, R. C., Principles and Practices of Incineration, Wiley-Interscience, New York, Table 1-3, p. 7, (1969).

Doedens, H. and K. Cord-Landwehr, "Leachate Recirculation" in Sanitary Landfilling: Process, Technology, and Environmental Impact, Christensen, Cossu, and Stegmann, Eds., Academic Press Inc., San Diego, CA, pp. 231-249, (1989).

Emberton, J. R., "The Biological and Chemical Characterization of Landfills," Proceedings of the Energy from Gas Symposium, Solihull, West Midlands, United Kingdom, (October 30-31, 1986).

Franklin and Associates Ltd., in World Wastes, (October 1986).

Gee, G. W., and D. Hillel, "Groundwater Recharge in Arid Regions: Review and Critique of Estimation Methods," Hydrological Processes, 2, pp. 255-266, (1988).

Gee, G. W. and T. L. Jones, "Lysimeters of the Hanford Site: Present Use and Future Needs," prepared for the U.S. Department of Energy, under contract DE-AC06-76 RLO 1830. Pacific Northwest Laboratory, Richland, Washington, p. 35, (October 1985).

Golueke, C. G, Biological Reclamation of Solid Wastes, Rodale Press, Emmaus, PA, p. 37, (1977).

Hartz, K. E. and R. G. Carlson, "The Multning Process for Disposal of Shredded Refuse," Public Works Magazine, p. 82, (December 1973).

Hartz, K. E. and R. K. Ham, "Moisture Level and Movement Effects on Methane Production Rates in Landfill Samples," Waste Management and Research, 1, pp. 139-145, (1983).

Heal, O. W. and D. D. French. "Decomposition of Organic Matter in Tundra," in Soil Organisms and Decomposition in Tundra, (Eds.) A. J. Holding et al., IBP Tundra Biome, pp. 279-310, (1974).

Jones, T. L. and R. L. Skaggs, "Influence of Hydrologic Factors on Leaching of Solidified Low-Level Waste Forms at an Arid Site Field-Scale Lysimeter Facility," Environmental Aspects of Stabilization and Solidification of Hazardous and Radioactive Wastes, ASTM STP 1033, (Eds.) P. L. Côté and T. M. Gilliam, American Society for Testing and Materials, Philadelphia, pp. 358-380, (1989).

Keenan, J. D., "Landfill Leachate Management," Jour. Resource Mgmt. & Technology, 14, 3, 177-188, (1986).

Klink, R. E. and R. K. Ham, "Effects of Moisture Movement on Methane Production in Solid Waste Landfill Samples," Resources and Conservation, 8, pp. 29-41, (1982).

Mandeville, R. D., "Fuel Gas from Landfill," in Clean Fuels from Biomass, Sewage, Urban Refuse, Agricultural Wastes, Symposium Paper, Institute of Gas Technology, Orlando, Florida, (January 27-30, 1976).

Peavy, H. S., Rowe, D. R., and G. Tchobanoglous, Environmental Engineering, McGraw-Hill, Inc., New York, New York, pp. 576-569, (1985).

Rees, J. F., "The Fate of Carbon Compounds in the Landfill Disposal of Organic Matter," Journ. of Chemical Technology & Biotechnology, 30, 161-175, (1980).

Saxton, K. E., "Soil Water Hydrology: Simulation for Water Balance Computations," Proceedings, Workshop on New Approaches in Water Balance Computations, Hamburg, W. Germany, (1983).

Tchobanoglous, G., Theisen, H., and R. Eliassen, Solid Wastes, McGraw-Hill, New York, New York, p. 10 and pp. 54-61, (1977).

Wildung, R. E., Garland, T. R., and R. L. Buschbom, "The Interdependent Effects of Soil Temperature and Water Content on Soil Respiration Rate and Plant Root Decomposition in Arid Grassland Soils," Soil Biology and Biochemistry, 7: 373-378, (1975).

Wilson, D. G. (editor), Handbook of Solid Waste Management, Van Nostrand Reinhold Co., New York, New York, pp. 12-39 and 204, (1977).

Appendix D
Traffic Impact Analysis

TRAFFIC IMPACT ANALYSIS

Eagle Mountain Landfill EIS/EIR

prepared for

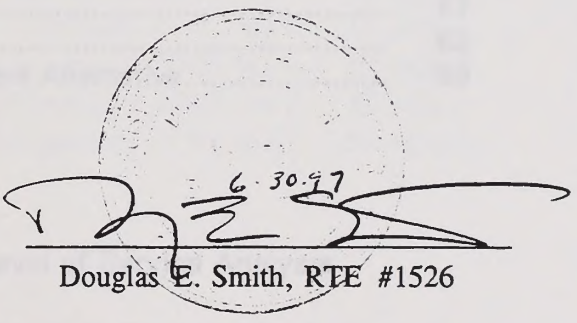
CH2MHill

by

DKS Associates

January 17, 1996

Revised: June 17, 1996



Douglas E. Smith, RTE #1526

Table of Contents

EXECUTIVE SUMMARY ES-1
Existing Conditions ES-1
Future Conditions Without the Project ES-3
Future Conditions With the Project ES-4
Project Alternatives ES-5

1. INTRODUCTION 1
1.1 Impact Assessment Criteria 6

2. EXISTING CONDITIONS 13
2.1 Rail Route Existing Conditions 13
2.2 Truck Route Existing Conditions 19
2.3 Existing Geometrics and Traffic Volumes 20
2.4 Existing Roadway Segment Operations 24
2.5 Existing Intersection Operations 26

3. FUTURE YEAR NO-BUILD CONDITIONS 27
3.1 Future Conditions Related to Rail Transport 27
3.2 Future Conditions on Study Area Roadways 32

4. PROJECT DESCRIPTION AND IMPACT ANALYSIS 42
4.1 Project Description and Impacts - Rail Related Characteristics 44
4.2 Project Description and Impacts - Highway System Related Characteristics 49

5. PROJECT ALTERNATIVES 65
5.1 No Action Alternative 65
5.2 Reduced Volume of On-Site Disposal Alternative 65
5.3 Alternate Road Access Alternative 66
5.4 Rail Access Only Alternative 67
5.5 Landfill on Kaiser Land Only Alternative 68
5.6 Landfill Development/No Townsite Development Alternative 69

Appendix A At-Grade Crossing Existing Conditions
Appendix B Traffic Count Data
Appendix C Existing Traffic Operating Conditions Level of Service Analysis Worksheets
Appendix D Future Conditions without the Project At-grade Crossing Analysis
Appendix E Future Conditions without the Project Traffic Operations Analysis Worksheets
Appendix F Future Conditions with the Project At-grade Crossing Analysis
Appendix G Future Conditions with the Project Traffic Operations Analysis Worksheets

Tables

Table 1	Protection Factor Values	9
Table 2	Definition of Level of Service Interpretation at Unsignalized Intersections	12
Table 3	Level of Service Interpretation - Freeway Segments	12
Table 4	Rail Line Segment Characteristics	15
Table 5	1995 Existing Conditions - Roadway Segment LOS Analysis Summary	24
Table 6	Level of Service Definitions for Roadway Segments	25
Table 7	1995 Existing Conditions Intersection LOS Analysis Summary	26
Table 8	Level of Service Definitions for Signalized Intersections	27
Table 9	Study Area Traffic Growth Rate Summary	29
Table 10	2000 Conditions Without Project Roadway Segment LOS Analysis Summary	35
Table 11	2000 Intersection LOS Summary (Without Project)	35
Table 12	2005 Conditions Without Project Roadway Segment LOS Analysis Summary	38
Table 13	2005 Intersection LOS Summary (Without Project)	38
Table 14	2010 Conditions Without Project Roadway Segment LOS Analysis Summary	41
Table 15	2010 Intersection LOS Summary (Without Project)	41
Table 16	Projected Waste Flow	42
Table 17	Average Number of Shipments by Transfer Station	44
Table 18	Routes from Transfer Stations to Eagle Mountain Landfill	45
Table 19	Delays Caused by Shipments from Each Transfer Station	46
Table 20	Townsite Trip Generation	54
Table 21	Year 2000 Roadway Level-of-Service Summary	62
Table 22	Year 2005 Roadway Level-of-Service Summary	62
Table 23	Year 2010 Roadway Level-of-Service Summary	62
Table 24	Year 2000 Intersection Level-of-Service Summary	63
Table 25	Year 2005 Intersection Level-of-Service Summary	63
Table 26	Year 2010 Intersection Level-of-Service Summary	64

Figures

Figure 1	Project Location	2
Figure 2	Rail Lines and Transfer Stations	4
Figure 3	Existing Roadway and Railway Access	5
Figure 4	Rail Line Analysis Segments	14
Figure 5	Existing (1995) Average Daily Traffic	22
Figure 6	Existing (1995) Peak Hour Traffic Volumes	23
Figure 7	Forecast 2000 Average Daily Traffic (Without Project)	33
Figure 8	Forecast 2000 Peak Hour Traffic Volumes (Without Project)	34
Figure 9	Forecast 2005 Average Daily Traffic (Without Project))	36
Figure 10	Forecast 2005 Peak Hour Traffic Volumes (Without Project)	37
Figure 11	Forecast 2010 Average Daily Traffic (Without Project)	39
Figure 12	Forecast 2010 Peak Hour Traffic Volumes (Without Project)	40
Figure 13	Proposed Roadway and Railroad Access	43
Figure 14	Roadway Segments	50
Figure 15	Roadways in Project Vicinity	51
Figure 16	Project Trip Directional Distribution for Townsite	53
Figure 17	Forecast 2000 Average Daily Traffic (With Project)	55
Figure 18	Forecast 2000 Peak Hour Traffic Volumes (With Project)	56
Figure 19	Forecast 2005 Average Daily Traffic (With Project))	57
Figure 20	Forecast 2005 Peak Hour Traffic Volumes (With Project)	58
Figure 21	Forecast 2010 Average Daily Traffic (With Project)	59
Figure 22	Forecast 2010 Peak Hour Traffic Volumes (With Project)	60

Executive Summary

EXECUTIVE SUMMARY

This report describes the results of a study of the transportation related impacts of the proposed landfill at Eagle Mountain. Potential impacts would affect two major modes of transportation, rail transport and highway transport.

At capacity, unit trains and trucks carrying refuse would deliver 20,000 tons of refuse to the site daily. The highway system would also be affected by the additional traffic related directly to on-site operations, such as employees traveling to and from the site, service vehicles, deliveries, and other traffic.

The overall report describes existing conditions related to both types of transportation, details the projected future conditions in the years 2000, 2005 and 2010 without the project, and describes the characteristics of the project related to transportation and the impacts of these characteristics on the surrounding transportation infrastructure in the study area.

Existing Conditions

Existing conditions along both the proposed rail routes to the site and on roadways in the vicinity of the project are assessed in detail. The study area for the rail mode of transport includes all rail lines that may carry refuse from transfer stations to the site. A total of six representative transfer station locations are identified, in San Bernardino, Los Angeles, and Orange counties. The primary rail study area includes the rail lines that are traversed by all refuse trains destined for the landfill. All rail lines carrying only a portion of the train traffic are referred to as the secondary rail lines.

The rail route existing conditions analysis includes 268 miles of rail line, with more than 231 at-grade crossings identified along these lines. Data pertaining to usage of these crossings by both trains and highway vehicles were obtained at over 97% of these locations. The rail study area conditions were analyzed in detail at all at-grade crossings on the rail routes within 146 miles of the site (the primary segment), and at all at-grade crossings on secondary rail segments that would experience more than one-half hour of total vehicle delay (i.e., sum of delay of all vehicles waiting at the crossing while the train passes) when a train with the characteristics of the proposed refuse unit trains passed during the expected hours of unit train operation. A total of 95 at-grade crossings were targeted for detailed analysis, based on these criteria.

Existing train traffic volumes in the study area range from less than ten trains daily, at some crossings, to 50 trains per day in the vicinity of Colton. Train traffic along the primary segment ranges from 28 to 50 trains per day, with a median average of 35 trains per day along this segment. Train traffic along the secondary segments tended to be significantly lower, ranging from 2 to 35 trains per day.

The average daily volume of highway traffic using the at-grade crossings ranges from an average of 2,200 vehicles per day along the primary analysis segment to the highest average of 14,100 vehicles per day along one of the secondary analysis segments. The highest highway traffic volumes along the rail routes occur in Los Angeles and Orange counties.

Estimated at-grade crossing delays to highway vehicles resulting from the passage of a single refuse unit train were calculated for comparison to delays in later years, even though no unit trains of this type are currently operating. These delays ranged from very low (less than 0.01 total vehicle-hours of delay) at some primary rail segment locations to a high of 516 minutes of delay at Slauson Avenue in Huntington Park. Discussions with the California Public Utilities Commission suggest that delays at crossings on the Alameda Line serving the Port of Los Angeles are considered problematic. Delays at crossings in this part of the region typically ranged from one to three or more hours of cumulative delay per train.

Total delay to highway vehicles, using all of the at-grade crossings along the primary segment that would result from the passage of a single unit train under existing conditions, would be an estimated 270.16 minutes (4.50 vehicle-hour). The maximum average delay for an individual vehicle at any crossing would be approximately one to two minutes.

A measure of the relative hazard at each at-grade crossing was also calculated for existing conditions. This hazard index was used to rank the various at-grade crossings studied in detail, and ranged from a low of 300 to a high of 170,238. The index is intended to indicate the relative rank of each crossing, or how hazardous each crossing is relative to the others assessed, rather than establishing an absolute measure of hazard or risk.

Crossings along the primary segment tended to be ranked lower than crossings along the secondary analysis segments, with the highest ranked crossing along the primary segment in Riverside County being Dillon Road in Indio. The California Public Utilities Commission performs a similar calculation for informational purposes only. They are responsible for administering the federal Grade Crossing Improvement Program, and locations identified for improvements are determined based on discussion with local jurisdictions.

The assessment of existing conditions on roadways in the vicinity of the project focused on the interchanges of Interstate 10 with Eagle Mountain Road and Desert Center Rice Road, and roadways leading to the site of the proposed landfill. This analysis included examination of roadway geometrics, particularly characteristics critical to the usage of the proposed truck route by large vehicles, and system operations, as determined by the analysis of roadway segment and intersection operations during the peak hour of traffic in the study area.

The existing geometrics of the proposed truck route, Eagle Mountain Road and the proposed Eagle Mountain Road Extension, are well-suited to use by the trucks that will

be carrying refuse to the site. No evidence of deficient turning radii, horizontal and vertical alignment, or roadway widths was found along the existing portions of the proposed truck route.

Analysis of existing roadway segment and intersection operations indicates that current operations are excellent, with Level of Service "A" (LOS A) conditions for all traffic movements analyzed.

Future Conditions Without the Project

The proposed landfill is expected to begin operations in the latter part of the 1990s, but will not be at capacity until approximately the 25th year of operation. Conditions within the transportation study areas will have changed, and it is necessary to project and analyze these changes to provide a valid baseline condition for estimation of project impacts.

The physical characteristics of the rail and highway system are not expected to undergo significant change between 1989 and 1995. The volume of rail traffic on the rail lines studied is also expected to remain fairly static during this period. Highway traffic volumes, however, are sensitive to the increasing urbanization of the region, and these increases will affect both the rail and highway analyses.

The annual growth rates for highway traffic using at-grade crossings and on roadways included in the highway impacts study area were projected based on the Southern California Association of Government's 1994 Regional Comprehensive Plan which specifically addresses growth in travel demand through the year 2015 for 15 individual subregions and six counties within SCAG's jurisdiction in the State of California. For this study, annual traffic growth rates were developed for the key time periods. The growth rates were then used to inflate the existing traffic volumes for the years 2000, 2005 and 2010.

The overall at-grade crossing delays that would be caused by the passage of a single unit train of refuse would increase because of the increased number of vehicles impacted, although the average per vehicle delay would not change significantly. The total delay caused by such a train traversing the primary segment (Colton to Eagle Mountain) during the nighttime hours of operation anticipated would increase by 25%.

Recalculation of the hazard indices for each of the at-grade crossings assessed under existing conditions indicates that the faster growth in the outlying areas of the region would result in somewhat higher positions in the overall ranking of at-grade crossings by hazard level. However, the highest ranked location in Riverside County, Dillon Road in Indio, would continue to be ranked 34th. The highest ranking locations, based on hazard index, would still be found in the more urbanized parts of the study area, Los Angeles and Orange counties.

The increased traffic volumes were also used to reassess roadway segment and intersection operating conditions. The results of this analysis indicate that LOS A conditions are projected for all traffic movements analyzed. This represents the best possible traffic conditions on the traffic engineer's scale.

Future Conditions With the Project

The project is expected to be capable of accepting up to six unit trains per day at the marshalling yard. An average of 4.7 shipments per day will be required when the project is operating at capacity (20,000 tons of waste per day). These shipments will require twice as many trains per day, one to deliver the waste, and a second outgoing train returning empty containers to the transfer station.

Based on this description, an average of 9.4 trains per day will utilize the primary rail segment, with fewer trains on each of the secondary segments. The maximum number of vehicles delayed at any one crossing on the primary rail line segment would be 24 vehicles at Dillon Road in Indio. The average delay experienced by each of these vehicles is 0.8 minute (about 45 seconds). A total of 2.5 minutes would pass from the moment the gate started down until the moment the last car at the rear of the vehicle queue crossed the railroad tracks. The total delay at each individual crossing is projected to range from 0.01 to 0.21 hour per train, significantly less than the one to three hours of cumulative delay encountered at crossings identified by the California Public Utilities Commission as experiencing delay problems. Based on this fact, there is no significant impact on delays along the primary segment.

The total daily delay caused by the passage of these trains on the primary segment will be slightly less than 11 vehicle-hours. When the delay incurred by vehicles using the at-grade crossings analyzed on the secondary segments are included, the total delay increases to nearly 80 vehicle-hours daily. Most of the delays (46 vehicle-hours) occur along the line servicing Orange County.

Overall, these delays compare favorably with other rail facilities. The delay at a single at-grade crossing located in the southern California region can be 100 to 300 vehicle-hours daily. Similarly, the delay caused by the traffic light at a single intersection of two arterials carrying 20,000 vehicles daily is on the order of 300 vehicle-hours per day.

The impact of the project on the level of hazard for the various at-grade crossings studied was also analyzed. Overall, the number of Riverside County at-grade crossings in the top half of the rankings did not change and no crossing is in the highest seven percent of the rankings, the benchmark established to identify a deficiency.

In addition to the empirical analysis and comparison conducted, the effect of the project on rail operations and safety was discussed with Southern Pacific Transportation Company and the California Public Utilities Commission. Their response to the proposed

schedule and operations of the project is that the proposed train schedule is feasible and the project will not create any significant new safety hazards.

The project is also expected to affect the highway network. A total of 100 two-way truck trips will be required each day to deliver 2,000 tons of refuse by this mode of transport. The expected on-site activities are projected to generate an additional 500 trip ends (or 250 two-way trips) because of employee and other on-site activity related trips.

Almost all of the truck trips and 85% of the other trips are expected to be to and from the west of Eagle Mountain. The other trips to and from the site are expected to be divided between the east (10%) and the north (5%).

Analysis of the operating conditions on roadway segments and at the intersections included in the study indicates that all traffic movements will continue to experience LOS A operations.

The impacts related to realignment of the Eagle Mountain Railroad and the extension of Eagle Mountain Road were also examined. The realignment of the Eagle Mountain Railroad will create a new crossing with Kaiser Road. The hazard level at this location was analyzed assuming an at-grade crossing with various types of protection, such as signing or automatic gates. It is recommended that an automatic gate be constructed at this location, because of the nearby elementary school. This at-grade crossing would be ranked 95th out of 96 crossings under these conditions (e.g., there was only one less hazardous crossing location studied).

Similarly, the extension of Eagle Mountain Road will also create an intersection with Kaiser Road. Prior to the development of the rail yard II, truck traffic entering the project site from Eagle Mountain Road extension will be controlled by a single stop sign on Eagle Mountain Road at its' intersection with Kaiser Road. It is recommended that this location be controlled by a two-way stop sign configuration, with the stop signs located on the lower volume roadway, Kaiser Road.

Project Alternatives

Six alternatives to the project have been identified and analyzed in this study. The first alternative or the **No Action Alternative** would leave the Eagle Mountain iron-ore site in its present condition and no landfill would be developed. The limited mining-related activities would continue at least temporarily.

The second alternative, or the **Reduced Volume of Onsite Disposal Alternative** would reduce the quantity of material shipped by rail to up to 14,000 tons per day and would also reduce the quantity of material shipped by truck to as much as 2,000 tons per day.

The reduction would result in an average of 4.1 trains per day delivering refuse to the site. The amount of delay would be reduced proportionately. The reduction in truck

traffic would affect only Interstate 10, Eagle Mountain Road and the Eagle Mountain Extension. Level of service C or better conditions would still prevail for all traffic movements analyzed in the study area.

The third alternative, the **Alternate Road Access Alternative,** would use the existing Kaiser Road to bring waste to the site instead of the existing Eagle Mountain Road and its proposed extension.

The potential impacts under this alternative would be identical with those of the proposed project with the exception of an increase in landfill vehicle miles traveled that would affect overall mobility and the safety hazards associated with school buses. The impacts of this alternative are not considered significant.

The **Rail Access Only Alternative,** the fourth alternative, would eliminate the transport of refuse to the landfill via trucks. All deliveries would be made by rail and the overall quantity of waste handled would be reduced by 10 percent (from 20,000 tons per day to 18,000 tons per day).

This alternative would significantly reduce the overall volume of traffic to the project site and would also decrease the percent of truck traffic generated by the landfill. The benefit of this reduction in truck traffic would be evident along Eagle Mountain Extension Road and on Eagle Mountain Road between the Kaiser Road and the Interstate 10 interchange, the proposed route for delivery of waste to the site.

The fifth alternative, the **Landfill on Kaiser Land Only Alternative,** would allow for operation of the landfill in the absence of implementing the proposed land exchange between the BLM and Kaiser. The landfill would accept a minimum of 16,000 tons per day of municipal solid waste. Landfill design, construction, operation, environmental monitoring and closure and postclosure are identical to the proposed project.

Under this alternative, the amount of traffic for landfill construction and operations would be slightly reduced. The expected life of the landfill will be reduced. The number of employees will likewise be reduced. Mitigation measures would be the same as those associated with the proposed Project.

The sixth alternative, the **Landfill Development/No Townsite Development Alternative,** would proceed with the Project as proposed but the Townsite Specific Plan would not be approved and improvements would not occur within the existing Townsite. As such, employees working at the landfill will not reside in the Townsite and would most likely reside in and commute from adjacent communities. Since traffic demands are reduced, potential impacts will be below the level of significance.

1. Introduction

1. INTRODUCTION

The proposed Eagle Mountain landfill will provide a much needed increase in the Southern California region's waste disposal capacity. The effects of the landfill on the transportation infrastructure have been studied, and the results of the transportation study are discussed in this report. The proposed project is expected to utilize two modes of transportation to supply the landfill with refuse, rail and highway. Figure 1 presents the location of the project with respect to the region.

The majority of trash transported to the site would arrive via rail in the future, as the Eagle Mountain site is served by a privately owned rail spur constructed by Kaiser Corporation to haul iron ore from the Eagle Mountain Mine to its steel plants located elsewhere in the region. In the project build out scenario, trash would be delivered by both rail and truck. At buildout, an estimated 18,000 tons of trash per day would arrive via rail, the remaining 2,000 tons are projected to arrive by truck. The 8,000 foot long unit trains used to transport trash to the site would be considerably shorter and lighter than the ore trains previously leaving the site.

The trash would be collected at approximately six transfer stations located near the areas generating trash throughout the greater Los Angeles region. The San Gabriel Valley is one area where large quantities of trash are generated while remaining landfill capacity is dwindling rapidly. The City of Los Angeles is another area that has been identified as a possible client for the landfill.

The northern Orange, western San Bernardino, Ventura and San Diego county areas are also considered as potential clients for the Eagle Mountain landfill. The analysis of rail impacts was conducted assuming transfer station locations near the geographic centers of these wastesheds and along rail lines of the Southern Pacific Railroad. The Orange County area is served by a Southern Pacific line originating at Southern Pacific's Los Angeles Transportation Center.

The analysis conducted during the course of this study assumes that the transfer station would be located along this line, near the boundaries of Anaheim, Buena Park, and Fullerton. Similarly, the analysis of the San Bernardino wasteshed assumes that the transfer station would be located along the Southern Pacific's Alhambra/Yuma line in the Colton/Rialto/Fontana area. The use of these geographically centered locations for analysis reduces the possibility of a significant over or underestimation of project related impacts.

Rail lines have been divided into two basic categories, the primary rail line segment and secondary rail line segments. The primary rail segment includes the entire length of rail line that must be used by all shipments. The primary rail segment is 146 miles long, and includes the Eagle Mountain Railroad and the section of Southern Pacific Transportation Company's Yuma/Alhambra line between Ferrum Junction and Colton.

The assumed transfer station locations and rail lines potentially serving the project are shown in Figure 2.

A portion of the overall trash delivered to the Eagle Mountain landfill would arrive via truck. A maximum of approximately 2,000 tons of refuse per day is projected to arrive at the site using the surface highway network at buildout. Truck shipments in intermodal shipping containers and conventional transfer trailers would be accepted at the site. This truck traffic would use Interstate 10 (I-10) and Eagle Mountain Road to access the site. The Kaiser truck road would be realigned to avoid the populated areas near the former mine, and provide access directly to the proposed marshalling yard where deliveries of trash would be accepted and processed.

The analysis of rail impacts related to the project assesses both the increase in overall rail traffic on rail lines likely to serve the Eagle Mountain landfill, as well as the increase in at-grade crossing delays at the most heavily traveled roadway crossings along the rail routes. The effect of increased rail traffic on safety at the most heavily traveled at-grade crossings is also quantified, based on statistical accident data, traffic volumes, roadway geometrics, and type of traffic control.

The origins of shipments to the landfill via the truck mode of transport are less certain than the likely origins of rail-based shipments. Truck shipments of waste would likely come from a widespread variety of areas located nearer to the landfill than the rail shipments. The highway impact analyses in this report focus on the roadways providing access to the site, including I-10, the two interchanges located nearest the site, and the roads providing access to the site. These roadways are displayed in Figure 3.

Analyses related to the truck mode of transport included assessment of the suitability of the proposed route for truck traffic, and roadway and intersection volume-to-capacity (V/C) ratio and level of service analysis at the locations affected by the landfill. These analyses incorporate the impacts of employee traffic along with the expected truck traffic to the site, as well as cumulative traffic from the proposed Townsite Specific Plan.

Mitigation measures are developed to address geometric deficiencies in the proposed access routes for both modes of transport. Significant negative impacts, defined to include all impacts resulting in operational deficiencies along the proposed transportation routes, are also mitigated to achieve acceptable operating conditions on these facilities.

In addition to the analysis of project impacts, six project alternatives have been defined. The first alternative is the **No Action Alternative** which would leave the Eagle Mountain iron-ore site in its present condition and no landfill would be developed. The limited mining-related activities would continue at least temporarily.

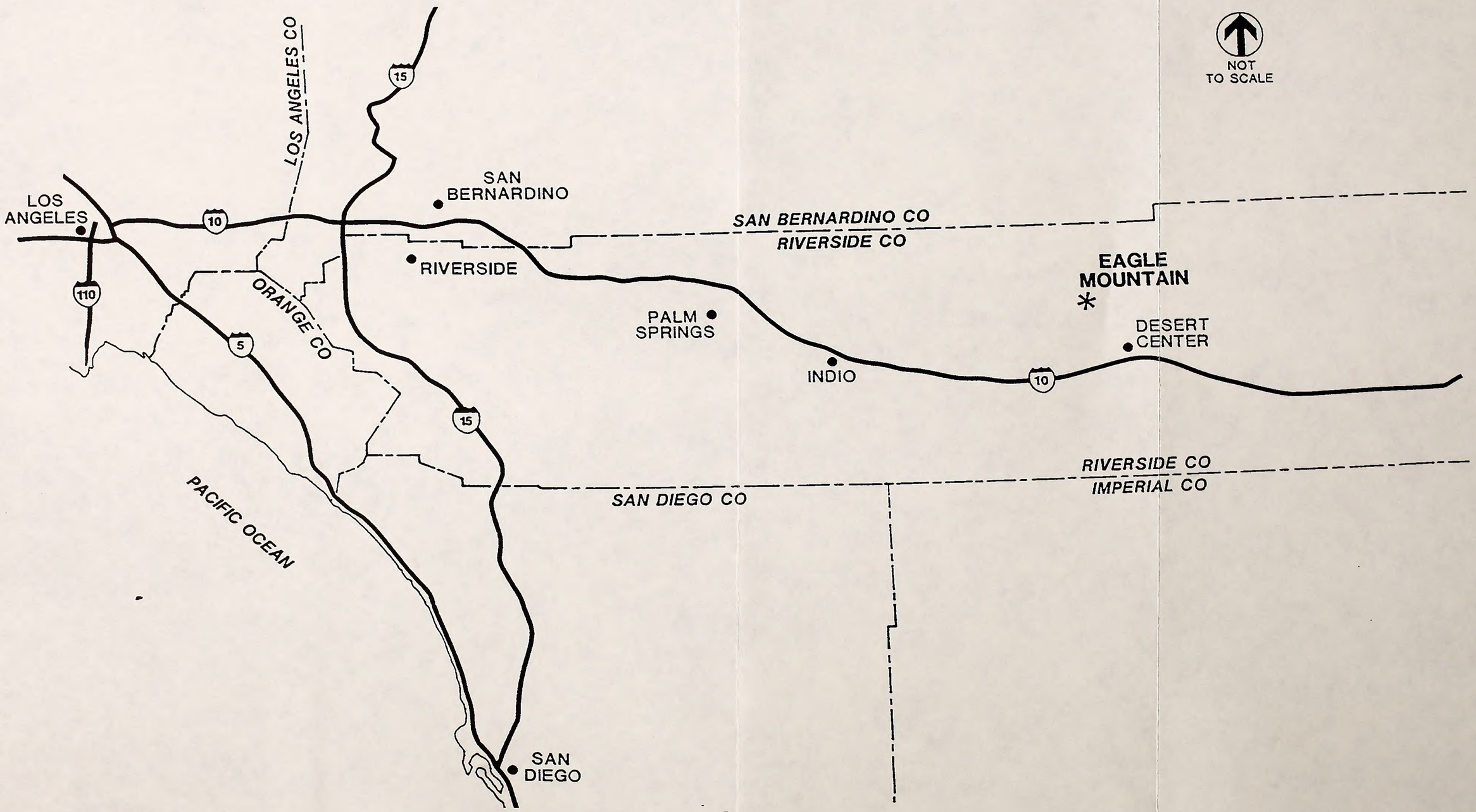


Figure 1
Project Location

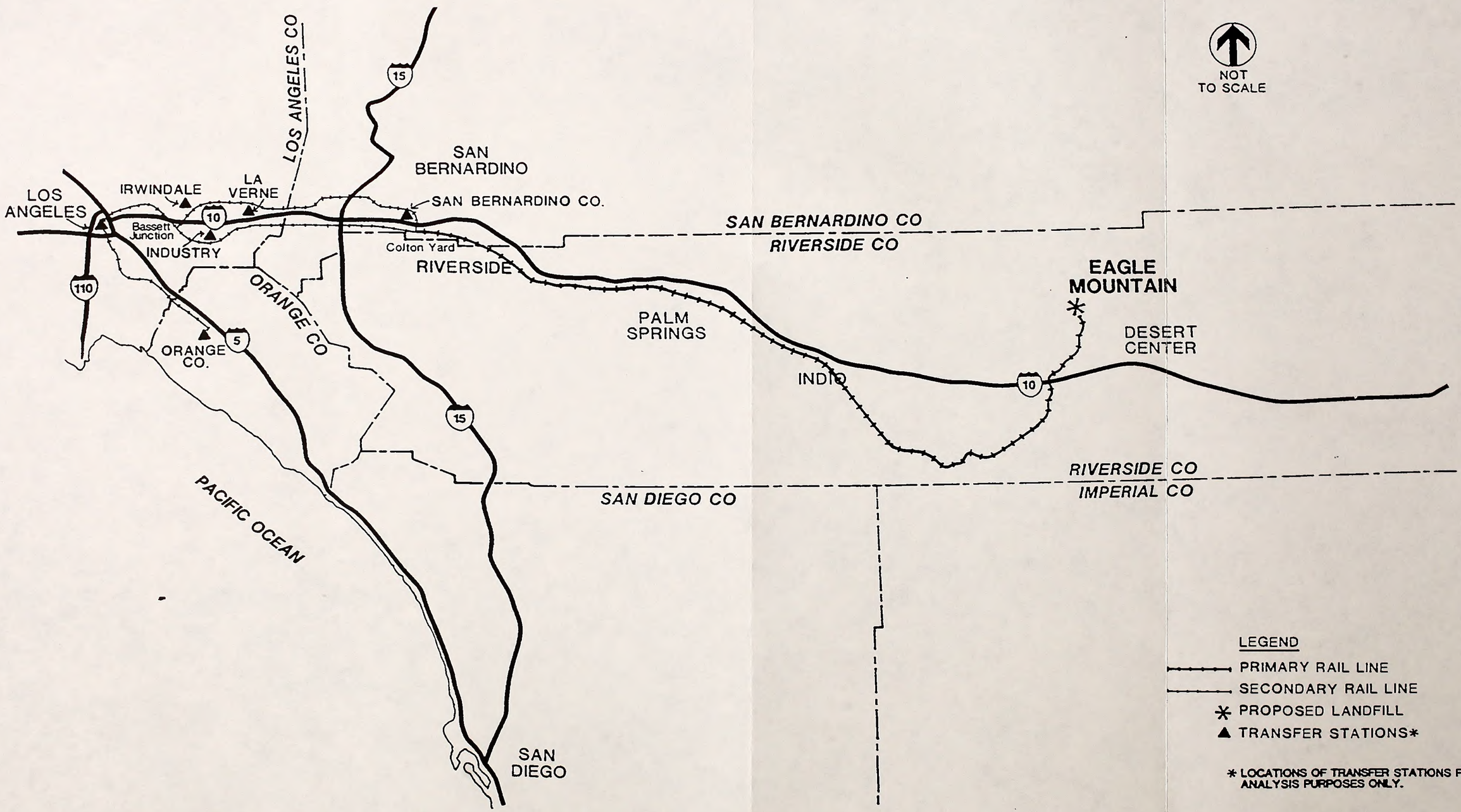
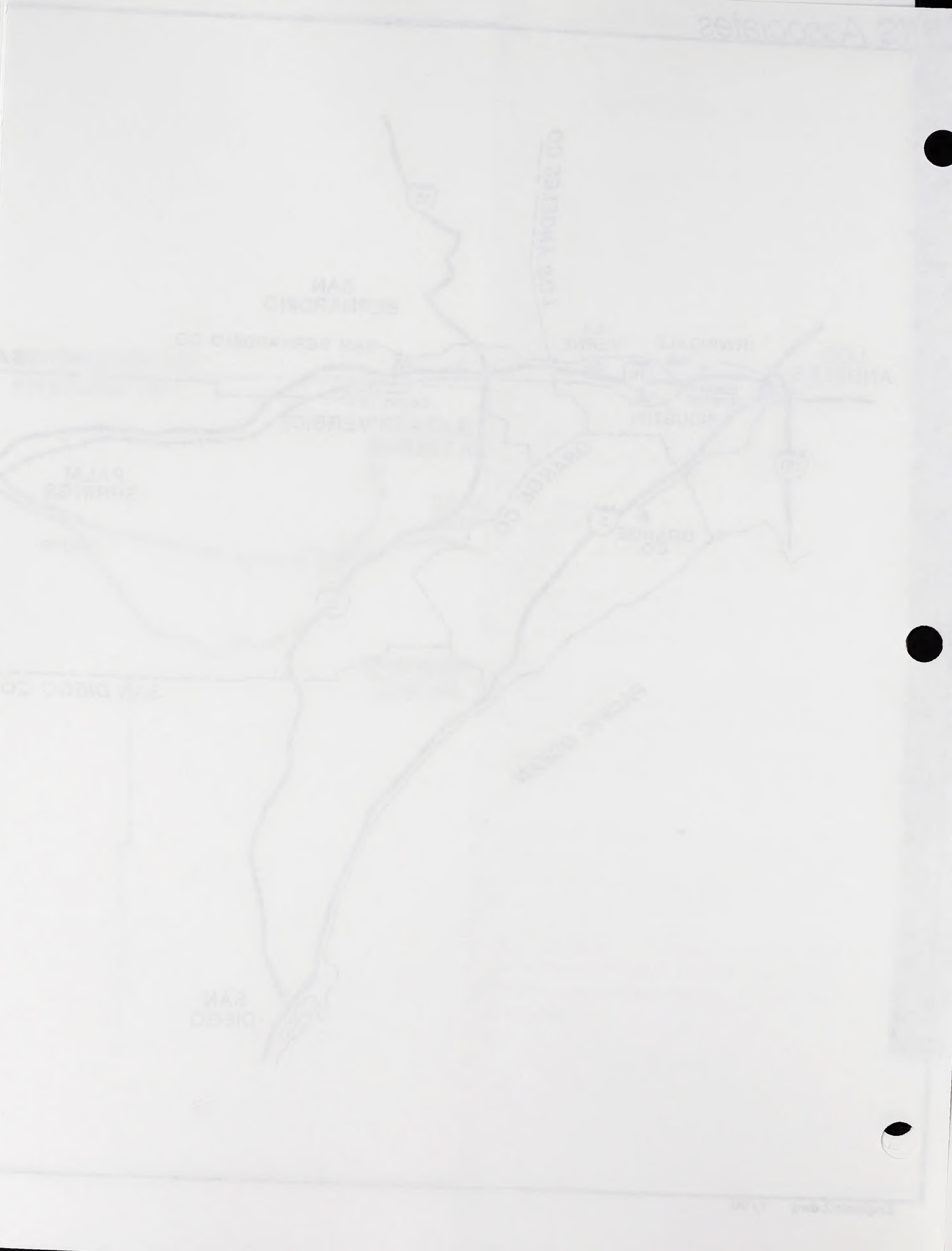


Figure 2
Rail Lines and Transfer Stations



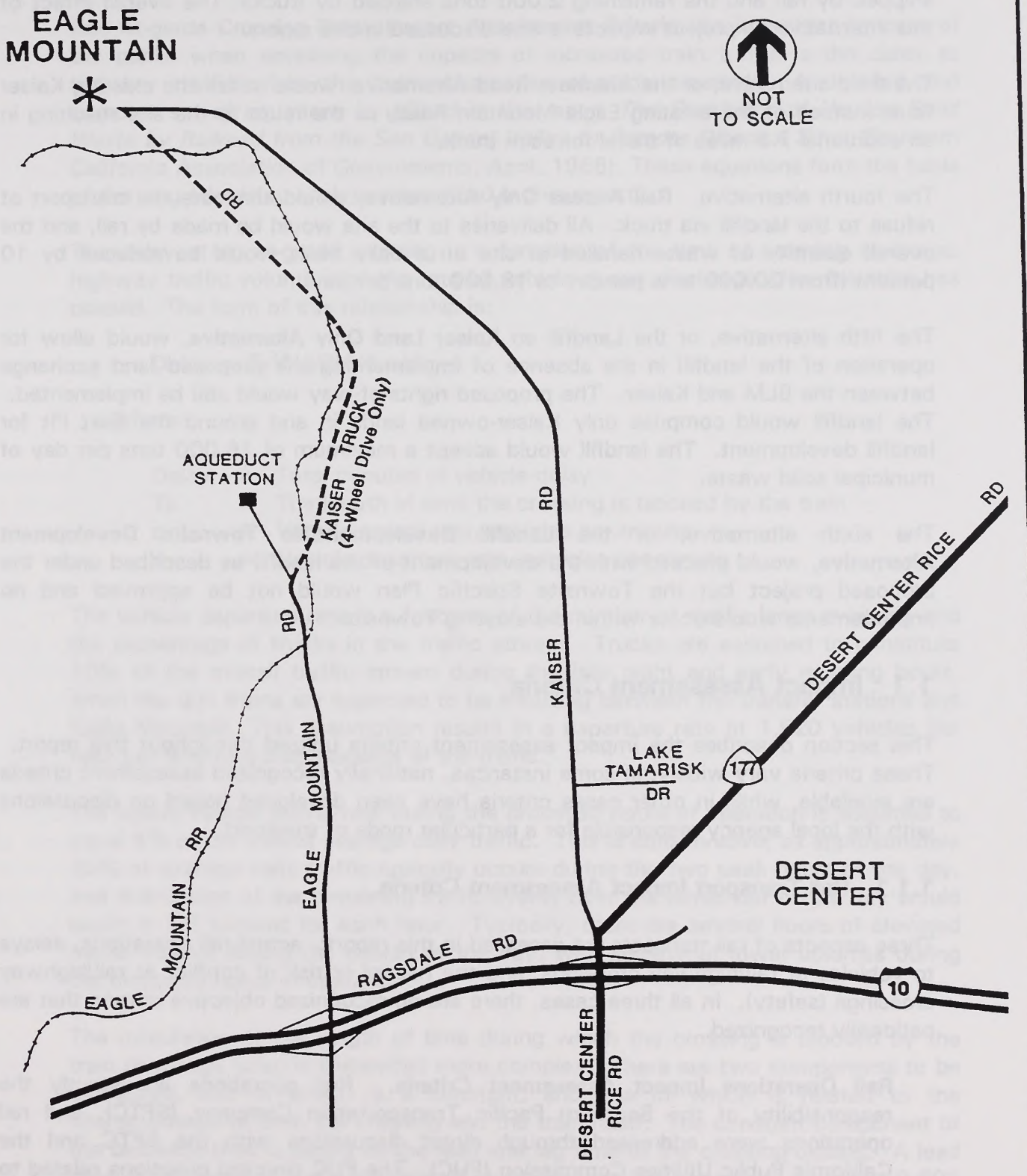


Figure 3
Existing Roadway and Railway Access

The second alternative, or the **Reduced Volume of Onsite Disposal Alternative,** would reduce the amount of refuse accepted at the site to 16,000 tons daily; 14,000 tons shipped by rail and the remaining 2,000 tons shipped by trucks. The overall effect of this alternative on project impacts is also discussed in this report.

The third alternative, or the **Alternate Road Alternative,** would utilize the existing Kaiser Road instead of the existing Eagle Mountain Road, as the route to the site resulting in an additional 7.5 miles of travel for each truck.

The fourth alternative, **Rail Access Only Alternative,** would eliminate the transport of refuse to the landfill via truck. All deliveries to the site would be made by rail, and the overall quantity of waste handled at site on a daily basis would be reduced by 10 percent (from 20,000 tons per day to 18,000 tons per day).

The fifth alternative, or the **Landfill on Kaiser Land Only Alternative,** would allow for operation of the landfill in the absence of implementing the proposed land exchange between the BLM and Kaiser. The proposed rights-of-way would still be implemented. The landfill would comprise only Kaiser-owned lands in and around the East Pit for landfill development. The landfill would accept a maximum of 16,000 tons per day of municipal solid waste.

The sixth alternative, or the **Landfill Development/No Townsite Development Alternative**, would proceed with the development of the landfill as described under the proposed project but the Townsite Specific Plan would not be approved and no improvements would occur within the existing Townsite.

1.1 Impact Assessment Criteria

This section describes the impact assessment criteria utilized throughout this report. These criteria vary widely; in some instances, nationally recognized assessment criteria are available, while in other cases criteria have been developed based on discussions with the local agency responsible for a particular mode of transport.

1.1.1 Rail Transport Impact Assessment Criteria

Three aspects of rail transport are assessed in this report: actual rail operations, delays to vehicles at rail/highway crossings, and the hazard or risk of conflict at rail/highway crossings (safety). In all three cases, there are no recognized objective criteria that are nationally recognized.

Rail Operations Impact Assessment Criteria. Rail operations are strictly the responsibility of the Southern Pacific Transportation Company (SPTC), and rail operations were addressed through direct discussions with the SPTC and the California Public Utilities Commission (PUC). The PUC directed questions related to actual rail operations (scheduling, etc.) to the SPTC. A deficient condition has been

defined as a situation where SPTC has indicated that a proposed schedule is not feasible.

Rail At-grade Crossing Delay Impact Assessment Criteria. An important concern of the public when assessing the impacts of increased train traffic is the delay to highway traffic when the train crosses an at-grade crossing. A detailed and complex set of equations is utilized in the report *The Feasibility of Hauling Solid Waste by Railroad from the San Gabriel Valley to Remote Disposal Sites* (Southern California Association of Governments, April, 1988). These equations form the basis of the at-grade delay analyses described in this report.

The delay at an at-grade crossing is a function of the time of crossing blockage, highway traffic volume, and the rate of vehicle queue discharge after the train has passed. The form of this relationship is:

$$Delay = T_B^2 * (q/2) * (1-q/d);$$

Where:

Delay	=	Total minutes of vehicle delay
T_B	=	The length of time the crossing is blocked by the train
q	=	Vehicle arrival rate, vehicles per minute
d	=	Vehicle departure rate, vehicles per minute

The vehicle departure rate is a function of the number of traffic lanes available and the percentage of trucks in the traffic stream. Trucks are assumed to constitute 10% of the overall traffic stream during the late night and early morning hours, when the unit trains are expected to be traveling between the transfer stations and Eagle Mountain. This assumption results in a departure rate of 1,520 vehicles per hour per lane following passage of the trains.

The hourly vehicle arrival rate during the proposed hours of operation is assumed to equal 4% of the overall average daily traffic. This is conservative, as approximately 20% of average daily traffic typically occurs during the two peak hours of the day, and distribution of the remaining traffic evenly over the remainder of the day would result in 3.6 percent for each hour. Typically, there are several hours of elevated traffic volume during the course of the day, with somewhat lower volumes during the proposed hours of operation.

The calculation of the length of time during which the crossing is blocked by the train (blockage time) is somewhat more complex. There are two components to be calculated, one of which is a constant, and one of which is related to the characteristics of both the crossing and the train itself. The constant component of the blockage time is based on the lead and lag time of the crossing closing. A lead time of 28 seconds and a lag time of eight seconds are typical, or a total of 0.603 minute.

The variable component of the gate blockage time is equal to the span of time that starts when the front of the train enters the near side of the intersection and ends when the back of the train passes the point beyond the intersection that signals the end of the blockage to the crossing mechanism. The distance beyond the intersection is normally 50 feet, and this value will be used in the subsequent calculations. Algebraically, the overall gate blockage time is:

$$T_B = .603 + ((50 + l + w)/v);$$

Where:

l = length of the train in feet
w = roadway width at the crossing in feet
v = train speed in feet per second.

Train speeds were determined based on SPTC timetables for train traffic along the various segments. The width of each roadway was either obtained from the jurisdiction responsible for the roadway in the vicinity of the crossing or was estimated based on the number of lanes and assuming a typical lane width of twelve feet per lane.

In addition to the total delay incurred at each crossing, the number of vehicles delayed is also of interest. Based on the variables defined previously, the total number of vehicles delayed at a crossing is:

$$\text{Vehicles Delayed} = T_B * q/(1-q/d).$$

Once the total delay and the number of vehicles delayed are computed, it is quite simple to calculate the average delay per vehicle, which will also be used to describe the impacts related to the added train traffic.

The reports reviewed did not establish a benchmark criteria for delay related deficiencies, but discussions with the PUC resulted in their identifying locations along the heavily utilized Alameda Corridor which serves the Port of Los Angeles as the only area where problematic delays occur in this region. The delays incurred at crossings along this corridor by nighttime operations of a single refuse train under existing conditions will, therefore, serve as the benchmark for identifying deficient conditions on the primary segment of the rail line. These benchmark delays are on the order of one to three hours of cumulative delay (all vehicles impacted). The delays on the primary segment will also be compared to delays on other parts of the system studied.

Rail Safety Impact Assessment Criteria. The most widely utilized measure of rail safety at at-grade crossings is known as the hazard index. This index is intended to identify the relative estimated hazard among the crossings included in the analysis. It is not intended to specifically identify high or low probability of accidents, nor is it meant to predict rail/vehicular traffic accidents due to the presence of increases in train activity.

The United States Department of Transportation has funded considerable research into the subject of safety at at-grade crossings. Although numerous hazard indices have been developed, a study of eleven different indices of varying complexity (i.e., some included historic accident information, others were based on probability distribution formulations, etc.) concluded that all of the indices studied gave basically the same rankings (Bezkorovainy, Georgy, and Holsinger, Robert - *Optimum Hazard Index Formula for Railroad Crossing Protection for Lincoln, Nebraska,* 1967, 18 pp.). Furthermore, the following equation best fit the composite arithmetic average of all the rankings as determined by the eleven different hazard index formulae:

$$H = V * T * P_f$$

Where: H = The calculated hazard index
V = The average twenty-four hour traffic volume
T = The average twenty-four hour train volume
P_f = The protection factor

The protection factor is a function of the type of protection present at the crossing; the applicable values of this factor are presented in Table 1. The protection values have been developed based on empirical studies of the effectiveness of various types of warning devices.

The PUC, which is responsible for rail activities and safety in California, was consulted regarding the identification of locations with safety deficiencies. The identification of locations targeted for improvements is performed on the basis of subjective rather than objective criteria. Although they often perform a similar hazard index calculation, this is done for informational purposes only. Deficient locations are identified through meetings involving the PUC, local agencies, the California Department of Transportation (Caltrans) and the railroad.

TABLE 1
Protection Factor Values

PROTECTION TYPE	PROTECTION FACTOR
Crossbuck	1.00
Signs	1.00
Wigwag	0.34
Flashing Light	0.20
Automatic Gates	0.11

The PUC list of locations targeted for improvement currently includes approximately 600 crossings, or 7% of the 8,700 crossings in California. Based on this fact, a potentially deficient condition will be noted whenever a crossing on the primary segment falls within the top 7% of the grade crossings studied.

The potential impact of the project from a safety perspective has also been discussed directly with the PUC. The discussion included the need for data for crossings as far from the site as Santa Barbara and San Diego. It was agreed that the actual impact of the project on these crossings would be minimal relative to the overall expected increase in traffic and rail demand not associated with the project. Grade crossing data for these segments were reviewed and based on the projection of less than one train of waste on these two lines, it was determined that no further analysis was necessary. Data for all crossings was reviewed and analyzed.

1.1.2 Roadway Impact Assessment Criteria

Two types of analyses have been conducted as part of the roadway impact assessment: roadway segment analysis and intersection operations analysis. The roadway segment analysis and the intersection operations analysis are both based on methodologies presented in the *Highway Capacity Manual* (Special Report 209, Transportation Research Board, Washington, D.C., 1994). The *Highway Capacity Manual* (HCM) is the most widely recognized standard for roadway impact analysis in the nation, and provides analysis methodologies explicitly intended for assessing the types of conditions found in the study area. All projected truck traffic has been shown in passenger car equivalents (PCCs) to accurately model the actual impacts of additional truck traffic on the system.

Roadway Segment Impact Assessment Criteria. The roadway segments serving the proposed project site have been analyzed using the analysis methodology for two-lane highways (Chapter 8), which is defined simply as a two-lane roadway having one lane for use by traffic in either direction. The methodology can be used to determine the level of service (LOS) for a segment of roadway based on the following characteristics:

- The traffic volume
- The directional distribution of traffic
- The roadway lane and shoulder widths
- The proportion of heavy vehicles in the traffic flow

A maximum service flow rate is developed for each individual segment based on the above characteristics that corresponds to LOS A through LOS F, with LOS C being the normal limit of acceptable operations in non-urbanized areas. The service flow rates calculated in this fashion are compared to the actual or projected traffic volume on the segment to determine the segment's LOS. Any resulting level of service worse than LOS C is defined as a deficient condition, and a significant impact occurs wherever either a deficiency is created by the project or when the level of service at a previously deficient location degrades (i.e., LOS E to LOS F).

Unsignalized Intersection Impact Assessment Criteria. Unsignalized intersection operating conditions can also be assessed utilizing techniques outlined in the *1994 Highway Capacity Manual* (Chapter 10). A level of service (LOS) can be determined utilizing the methodology outlined in the manual for unsignalized intersections. Level of service is reported on a scale of A to F, with A representing excellent operating conditions and F representing extremely congested conditions. The definition of a significant impact is identical to the definition for roadway segments.

At unsignalized intersections which are controlled by stop signs, a level of service is measured for each traffic movement which is controlled by a stop or yield sign. For example, the minor street through and left-turn movements must first stop and then proceed only when the major street cross traffic is clear. Levels of service are therefore calculated for the minor street movements based on the availability of gaps in major street traffic that will allow minor street traffic to proceed through the intersection. The major street traffic is never forced to stop and experiences no delay; therefore no level of service calculation is required. The number of gaps in major street traffic not utilized by minor street traffic is referred to as the reserve capacity. The relationship between reserve capacity and level of service is summarized in Table 2.

1.1.3 Freeway Segment Impact Assessment Criteria

Freeway segment analysis is also based on the methodology provided in the CMP. The CMP provides key freeway monitoring stations with capacity and the 1993 traffic demand in vehicles per hour. For each station, a demand-to-capacity (D/C) ratio and corresponding LOS, as shown in Table 3, is provided. As stated previously, the midday peak hour was not evaluated. Therefore, midday level of service on the segment will likely be somewhere between the two directional extremes for the A.M. and P.M. peak hours.

Calculation of LOS Based on D/C ratios is a surrogate for the speed-based LOS used by Caltrans for traffic operational analysis. LOS F(1) through F(3) designations are assigned where severely congested (less than 25 mph) conditions prevail for more than one hour converted to an estimate of peak hour demand in the table above. Note that calculated LOS F traffic demands may, therefore, be greater than the observed traffic volumes

Project impacts are calculated from incremental increases to D/C ratios. The resulting LOS is then derived by comparison to Table 3.

TABLE 2
Definition of Level of Service Interpretation at Unsignalized Intersections

LEVEL OF SERVICE	DESCRIPTION	INTERSECTION AVERAGE TOTAL DELAY (sec/veh)
A	Excellent operation. All approaches to the intersection appear quite open, turning movements are easily made and nearly all drivers find freedom of operation.	≤5
B	Very good operation. Many drivers begin to feel somewhat restricted within platoons of vehicles. This represents stable flow. An approach to an intersection may occasionally be fully utilized and traffic queues start to form.	>5 and ≤10
C	Good operation. Occasionally drivers may have to wait more than 60 seconds and back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted. *This level is typically associated with design practice for peak periods in non-urbanized areas.*	>10 and ≤20
D	Fair operation. Cars are sometimes required to wait more than 60 seconds during short peaks. There are no long-standing traffic queues.	>20 ≤30
E	Poor operation. Some long-standing vehicular queues develop on critical approaches to intersections. Delays may be up to several minutes.	30 and ≤45
F	Forced flow. Represents jammed conditions. Back-ups from locations downstream or on the cross street may restrict or prevent movement of vehicles out of the intersection approach lanes; therefore, volumes carried are not predictable.	>45

Source: *Highway Capacity Manual,* Special Report 209, Transportation Research Board, Washington D.C., 1994.

TABLE 3
Level of Service Interpretation - Freeway Segments

D/C RATIO	LOS	D/C RATIO	LOS
0.00 - 0.35	A	> 1.00 - 1.25	F(0)
> 0.35 - 0.54	B	> 1.25 - 1.35	F(1)
> 0.54 - 0.77	C	> 1.35 - 1.45	F(2)
> 0.77 - 0.93	D	> 1.45	F(3)
> 0.93 - 1.00	E		

Source: 1993 Congestion Management Program for Los Angeles County

2. Existing Conditions

2. EXISTING CONDITIONS

The existing conditions along the proposed rail and highway routes serving the Eagle Mountain landfill were assessed to provide a basis for determining the impacts of the proposed project. The conditions along the rail route are discussed first, because of the greater quantity of materials to be shipped by rail, followed by the discussion of existing highway conditions.

2.1 Rail Route Existing Conditions

The rail route existing conditions section describes the characteristics of the rail lines, and the routes that would be traveled by trains between the transfer stations and the Eagle Mountain landfill. This section also estimates current at-grade crossing delays caused by a train with characteristics similar to the proposed refuse unit trains. Finally, an existing conditions relative hazard index is developed, incorporating the characteristics of the at-grade crossings and current traffic levels on both the highway and rail line at each crossing.

2.1.1 Rail Line Description

The rail lines serving the various transfer stations identified in the introduction of this report have been broken down into a total of eight discrete segments for the purposes of this analysis. The segments were identified based on the locations of the transfer stations along the rail lines and key junction points where trains would be switched on or off a particular route. These segments are displayed in Figure 4. The existing usage and characteristics of the rail line segments are discussed individually, while Table 3 summarizes the most important characteristics of each segment. The characteristics of the at-grade crossings are discussed within the individual segment descriptions, while Appendix A contains a comprehensive listing of the existing conditions at all at-grade crossings.

A total of 268 miles of rail line were analyzed during this study, with 231 at-grade crossings identified along their length, or an average of one at-grade crossing every 1.2 miles. Data pertaining to rail and highway traffic volumes and crossing geometric conditions were obtained from a variety of sources, including the Southern Pacific Transportation Company, the California Public Utilities Commission (PUC), the Southern California Association of Governments (SCAG), Caltrans and local city traffic surveys. Data was obtained for over 97% of the crossings. Average daily train volumes ranged from 2 to 50 trains per day, while traffic volumes on the roadways crossing these rail lines at-grade ranged from less than 1,000 vehicles daily to over 43,000 vehicles daily. The overall observed average is 7,200 vehicles per day. Train speeds are contingent on track design and have been obtained from the PUC.

TABLE 4
Rail Line Segment Characteristics

SEGMENT	FROM/TO	NUMBER OF CROSSINGS	LENGTH (MILES)	TRAIN VOLUMES	AVERAGE DISTANCE BETWEEN CROSSINGS	1996 AVERAGE DAILY VOLUME
1	Ferrum/Colton Yard	31	146	42	4.7	2,200
2	Colton Yard/Industry Transfer Station	20	33	43	1.6	3,700
3	Industry Transfer Station/Bassett Junction	9	11	28	1.2	10,100
4	Bassett Junction/SP's LATC	20	14	28	0.7	14,100
5	SP's LATC/North Orange County	50	21	4-30	0.4	12,900
6	Colton Yard/La Verne Transfer Station	74	38	2-28	0.4	3,700
7	La Verne Transfer Station/ Irwindale Transfer Station	19	9	4	0.5	3,000
8	Irwindale Transfer Station	8	4.5	4	0.6	7,600

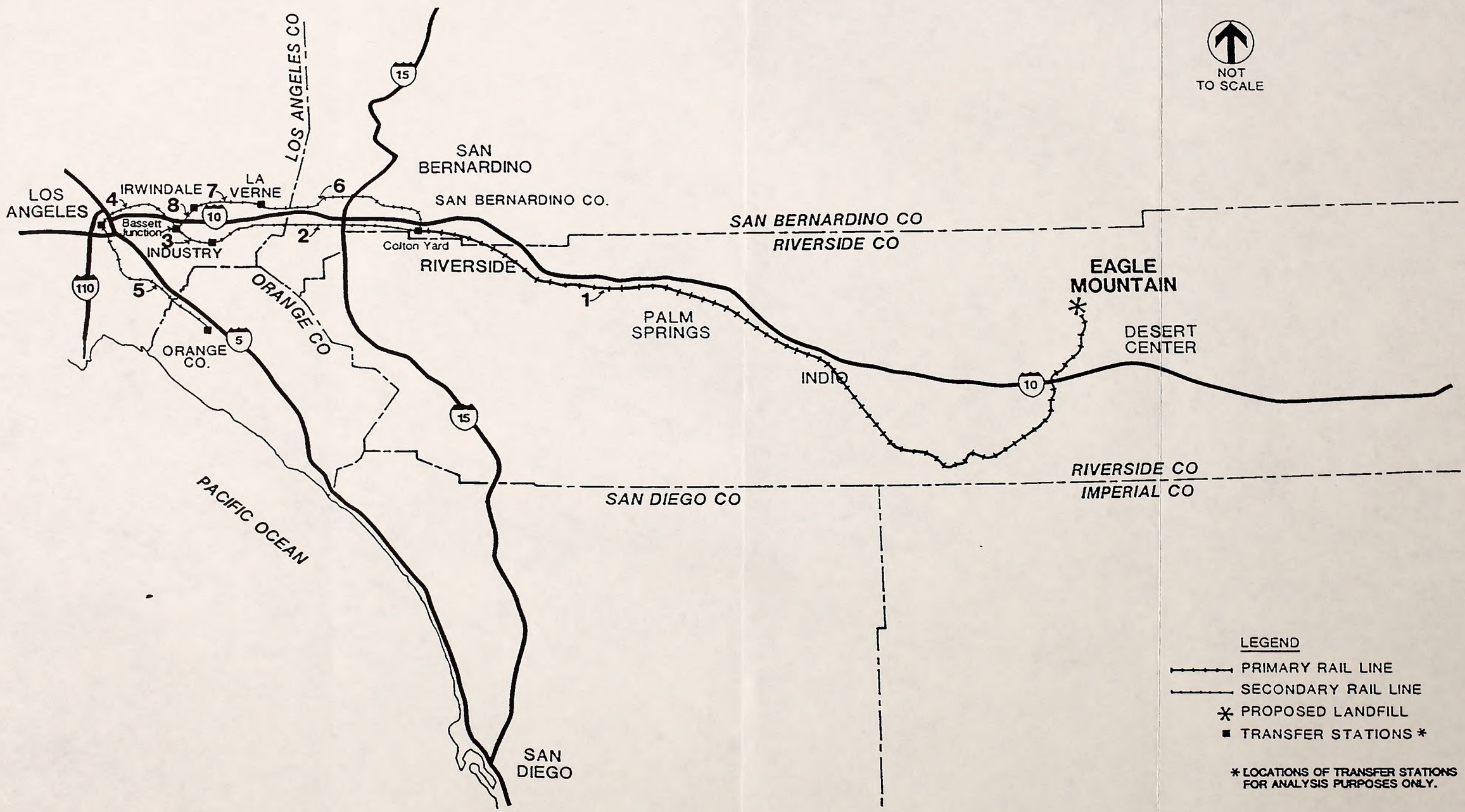


Figure 4
Rail Line Analysis Segments

Eaglemn4.dwg 1/96



SEGMENT 1: Eagle Mountain to the Colton Yard/San Bernardino Transfer Station. This 146-mile segment is the primary area of interest in this study, as all trains destined for the Eagle Mountain landfill would use this section of rail line to access the site. The segment is located in the least populated part of the study area, and consists of 52 miles of privately owned spur (the Eagle Mountain Railroad) and 94 miles of rail line owned by the Southern Pacific Transportation Company. The Southern Pacific's section is part of the Yuma/Alhambra main line. Although the segment is the longest of those studied, only 31 at-grade crossings were identified along its length. The average roadway daily traffic volume was 2,200 vehicles per day, the lowest of all segments studied.

The average distance between crossings is 4.7 miles, the highest of all segments identified. Even when the 52-mile private spur (which has no at-grade crossings) is eliminated from consideration, the average distance between at-grade crossings is still over three miles. This is nearly twice as high as the next highest average distance between at-grade crossings for the other 7 segments.

Daily train volumes along this segment range from 28 to 50 trains daily, with a median average of 35 trains. Train speeds on this segment are fairly high, ranging from 30 to 60 miles per hour (MPH).

SEGMENT 2: Colton Yard to the Industry Transfer Station. This segment is the second longest section under consideration in this EIS/EIR, and it is also a part of the Southern Pacific Transportation Company's (SPTC's) Yuma/Alhambra line. Twenty at-grade crossings were identified along its 33-mile length, or one at-grade crossing every 1.6 miles. The average at-grade crossing roadway volume on this segment was 8,700 vehicles per day, significantly higher than the average for the previous segment, and slightly higher than the overall observed average of 7,200 vehicles per day.

This is the second most heavily utilized rail line in the study area, with 28 to 35 trains per day using various portions of this segment. Most refuse trains would also use this segment of rail line, although shipments from Irwindale or La Verne could travel an alternate route to the Colton Yard. Both possible routes to and from these two transfer stations were assessed in the impact analysis. Train speeds on this segment are consistently high, ranging from 60 to 65 MPH.

The roadway volumes at the at-grade crossings along this segment range from 900 vehicles per day to 20,000 vehicles per day, with the majority of crossings carrying between 4,000 and 10,000 vehicles per day.

SEGMENT 3: Industry Transfer Station to Bassett Junction. This segment runs approximately 11 miles, from the east end of Industry to the west end of Industry, near Vineland Avenue. It is part of the SPTC's Yuma/ Alhambra Line, which connects with the SPTC's Baldwin Park line at Bassett Junction. Nine at-grade crossings are located along this segment, with roadway volumes ranging from less than 1,000 vehicles per day to over 28,000 vehicles per day. Daily vehicular traffic volumes at the at-grade crossings averaged 10,100 vehicles per day on this rail segment. The average distance

between crossings on this segment is 1.2 miles, somewhat less than the average distance between crossings on Segments 1 and 2.

The average number of daily trains along this segment is very consistent, with 28 trains per day reported at each of the at-grade crossings. The train speed for through traffic on this segment of rail line is 60 MPH.

SEGMENT 4: Bassett Junction to the Southern Pacific's Los Angeles Transportation Center. This segment, the final part of the Alhambra/Yuma line included in the study, is approximately 14 miles long, and terminates at the SPTC's major yard facility in East Los Angeles. This yard is located just east of the Los Angeles River channel and just north of the San Bernardino Freeway (I-10). There are a total of 20 grade crossings on this segment, each of which is located an average of 0.7 mile apart. The daily volume of train traffic is consistent along the length of this segment, with an average of 28 trains per day reported at each of the at-grade crossings. Train speeds begin to drop on this segment, ranging from 60 MPH down to 20 MPH.

Roadway traffic volumes at the at-grade crossings located along this segment are somewhat higher than the roadway volumes previously discussed. These volumes range from a low of 2,000 vehicles per day to over 30,000 vehicles per day at several crossings. The 14,100 vehicles per day average for at-grade crossings along this segment is the highest of the segments considered in this EIS/EIR.

SEGMENT 5: The Southern Pacific's Los Angeles Transportation Center to the Northern Orange County Transfer Station. This segment is 21 miles long and is comprised of pieces of the SPTC's San Pedro and Santa Ana lines. The total of 50 at-grade crossings identified result in an average of only 0.4 mile between crossings, the lowest of all segments studied. The roadway traffic volumes at the at-grade crossings are also relatively high, ranging from less than 1,000 vehicles per day to over 43,000 vehicles per day, the highest volume of roadway traffic in the study area. The average at-grade crossing vehicular volume on this segment is 12,900 vehicles per day, second highest of the segments studied.

Train speeds along this segment are generally low, ranging from just 10 miles per hour at the north end of the segment to a high of 20 miles per hour at the southern end of the segment. The average daily number of trains ranges from 4 to 30 trains per day, with most crossings experiencing 10 to 12 train crossings per day.

Only trains to and from the northern Orange County transfer station would utilize this segment. The last at-grade crossing included on the segment is at Stanton Avenue in Buena Park. The next at-grade crossing on the Santa Ana line is at Loara Street in Anaheim, a distance of 4.5 miles.

SEGMENT 6: The Colton Yard to the La Verne Transfer Station. There are a total of 74 at-grade crossings along this 30-mile length of rail line, or one crossing every 0.4 mile. The average vehicular traffic volume for at-grade crossings along this segment is 3,700 vehicles per day, well below the overall observed average of 7,200 vehicles per day.

The number of trains traversing this segment is among the lowest in the area under review. Between 2 and 28 trains per day traverse the various at-grade crossings along this segment, with only two trains per day at most crossings. Train speeds are only 10 MPH on this segment.

SEGMENT 7: The La Verne Transfer Station to the Irwindale Transfer Station. This segment of rail line is only 9 miles long, and could be used by shipments from the Irwindale transfer station (eastbound) or the La Verne transfer station (westbound). The traffic volumes at the at-grade crossings on this segment are again lower than the overall study area average. The average along this segment is 3,000 vehicles per day, lower than any other segment except Segment 1.

There are a total of 19 crossings along this 9-mile long segment of railroad, or an average of two at-grade crossings per mile along this segment, ranking third among the segments analyzed. Train traffic along this segment is very consistent, with an average of four trains per day reported at each of the at-grade crossings. Travel speeds on this segment of rail line are again 10 MPH.

SEGMENT 8: The Irwindale Transfer Station to Bassett Junction. This segment, which is only 4.5 miles in length, connects the Baldwin Park line of the SPTC's rail network to the Alhambra/Yuma line. Use of this segment would be similar to the usage described for Segments 6 and 7, with shipments possible from either the Irwindale Transfer Station or the La Verne Transfer Station.

The average traffic volume at the 8 at-grade crossings along this segment is 7,600 vehicles per day, slightly higher than the overall study area average of 7,200 vehicles per day. The at-grade crossings are an average of 0.6 mile apart, approximately half the average distance of the segments discussed in this EIS/EIR. Train traffic along this segment averages four trains per day. Train speed along this segment is limited to 20 MPH along the entire 4.5-mile long segment.

Existing At-grade Crossing Delays. Under existing conditions, most crossings would experience relatively low delays during the passage of a refuse train. The description of delays here and in the impact analysis focuses on the at-grade crossings located along the primary study segment (Segment 1), and includes all locations along other segments where a total of at least one-half hour of vehicle delay would occur under existing conditions during the passage of a typical refuse train. This is the equivalent of the delay at a minor signalized intersection, serving 1,000 vehicles during a single peak hour, operating at LOS A (excellent operating conditions), with only two seconds of delay to each vehicle. On rail segments where this criteria was not met, a minimum of the two highest delay locations has been included in the analysis.

Along the primary segment, the total delay caused by the passage of a single train with the proposed configuration of the unit trains traveling to the site is 270.16 minutes (or 4.50 vehicle-hour). The maximum total delay at a single crossing is

approximately 15.4 minutes at Dillon Road in Indio in Segment 1. In general, per vehicle delays would typically be on the order of less than one minute for each vehicle.

Total delays at crossings along other segments range as high as 516 minutes (Slauson Avenue on Segment 5), where a total of more than 170 vehicles would be delayed by the passage of a single unit train (i.e., a train with an average length of 8,000 feet) and cause an average delay of 3.05 minutes to each vehicle affected by the train's passage. Although the Slauson Avenue crossing is not the highest volume crossing in the study area, a combination of low train speeds and fairly high traffic volumes (i.e., average daily traffic at this crossing is 30,400) results in the highest overall delay of any crossing in the study area. Based on this existing conditions analysis, a total of 231 crossings will be analyzed in the impact section of this report. This represents all 31 crossings along the primary segment and 200 locations along other segments within the study area.

Rail Line Existing Conditions Relative Hazard Index. A relative hazard index has been calculated for each of the at-grade crossings on the primary rail segment and all secondary rail segment crossings included in the delay analysis; these locations are also likely to involve the greatest number of conflicts between trains and vehicular traffic.

The actual values of the calculated hazard indices for existing conditions range from 300 to 170,238. The maximum value of the hazard index occurs at Slauson Avenue, on Segment 5. The type of protection at this location is warning signage, and an average of 28 trains and 30,400 vehicles per day use this crossing.

The highest hazard index value on Segment 1 is at Dillon Road in Indio (H = 33,712). The second highest hazard index value in Riverside County is at 22nd Street in Banning (H = 32,950). The existing protection at these crossings is gate protection, which is the safest form of protection at an at-grade crossing. For comparative purposes, the highest calculated hazard index in San Bernardino County is at Euclid Avenue (H = 120,634) with Milliken Avenue (H = 57,025) second. Again, both crossings are gate protected.

The highest calculated hazard index at a location in Riverside County not protected by gates is at 50th Avenue in the City of Coachella (H = 12,020). This location currently uses flashing lights for protection. For San Bernardino County, all railroad crossings are either grade separated or gate protected.

2.2 Truck Route Existing Conditions

The section discusses the highway network that would be used to access the landfill. Existing roadway geometrics are described, with particular attention to truck related characteristics, such as tight-turning and narrow-width lane. This section also presents

LOS definitions for signalized and unsignalized intersections, describes existing traffic volumes in the vicinity of the Project site, and analyzes current peak hour operating conditions. The peak hour is defined as the 60-minute period during the day when traffic volume is greatest.

2.3 Existing Geometrics and Traffic Volumes

As previously mentioned, truck traffic to the site will be generated from a variety of areas. The I-10 Freeway is the first route where all truck trips to the site will converge, and, therefore, is one major focus of the analysis. The other key routes included in the truck impact study are Eagle Mountain Road, Kaiser Road, Desert Center/Rice Road and Ragsdale Road. A description of the physical and operational characteristics of each route follows. Figure 5 displays Average Daily Traffic (ADT) volumes on each facility. Figure 6 shows existing peak hour traffic volumes. These counts were taken during the month of August 1995, except for the freeway volumes, which were counted by Caltrans in 1994. In addition, vehicle classification counts were taken on Eagle Mountain Road and Desert Center/Rice Road to determine the number and percentage of vehicles that use these two facilities. For the purpose of this EIS/EIR, the minimum criterion to be considered as truck traffic is for a vehicle to be equal to or greater than a two-axle, six-tire classification.

Turning movement counts were conducted during the hours of 7 a.m. to 9 a.m. and 4 p.m. to 6 p.m. on Tuesday, August 1, 1995, at the following locations:

- Desert Center/Rice Road/Interstate 10 Eastbound Ramps
- Desert Center/Rice Road/Interstate 10 Westbound Ramps
- Eagle Mountain Road/Interstate 10 Eastbound Ramps
- Eagle Mountain Road/Interstate 10 Westbound Ramps
- Eagle Mountain Road/Ragsdale Road

The traffic counts are included in Appendix B.

Interstate 10 Freeway. This freeway facility extends from the Los Angeles area through a portion of San Bernardino County into Riverside County. It passes the vicinity of the Project site approximately 50 miles west of Blythe, 60 miles east of Indio, and approximately 11 miles south of the Eagle Mountain landfill site. It is the major access route for all automobile and truck traffic originating at, or destined for, the project site. Access to the Eagle Mountain/Desert Center area is provided via two full-diamond interchanges (i.e., on and off ramps in both the eastbound and westbound directions) with Eagle Mountain Road and Desert Center Rice Road. Near the site, Interstate 10 has two lanes in each direction, and carries an average daily traffic volume of 16,000 vehicles, with a peak hour volume of 115 vehicles (Caltrans 1994 Traffic Volume Census).

Eagle Mountain Road. As currently proposed, Eagle Mountain Road would be the main surface roadway access route for truck traffic between I-10 and the Project site. The road runs from south of Interstate 10 to Kaiser Truck Road and the Eagle Mountain Aqueduct station located approximately seven miles north of the freeway. A full-diamond interchange (i.e., on and off ramps in both the eastbound and westbound directions) is provided at Interstate 10. Eagle Mountain Road is not a through road south of the freeway. Under the freeway overcrossing, it carries one lane in each direction within a 40-foot curb-to-curb cross section. North of the westbound ramps, it narrows to 32 feet, curb-to-curb. Ragsdale Road intersects Eagle Mountain Road in a "T" intersection immediately north of the westbound freeway ramps. The existing traffic volumes on Eagle Mountain Road and the freeway interchange are very low because the roadway primarily serves only traffic related to the operation and maintenance of the Colorado River Aqueduct. The average daily traffic volume on Eagle Mountain Road north of the freeway ramps is 82 vehicles, while north of Ragsdale Road it drops to 32 vehicles.

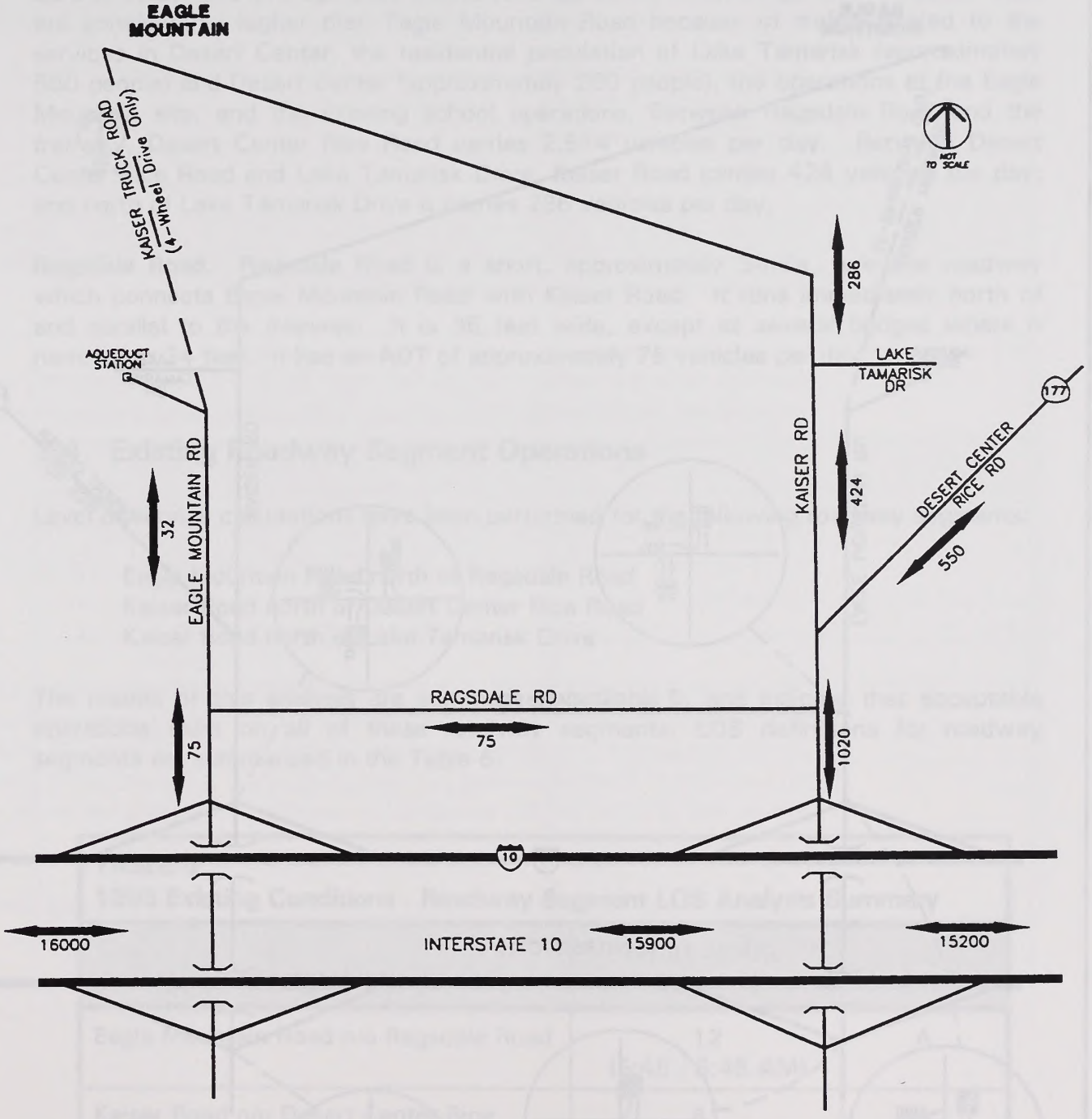


Figure 5
Existing (1995) Average Daily Traffic

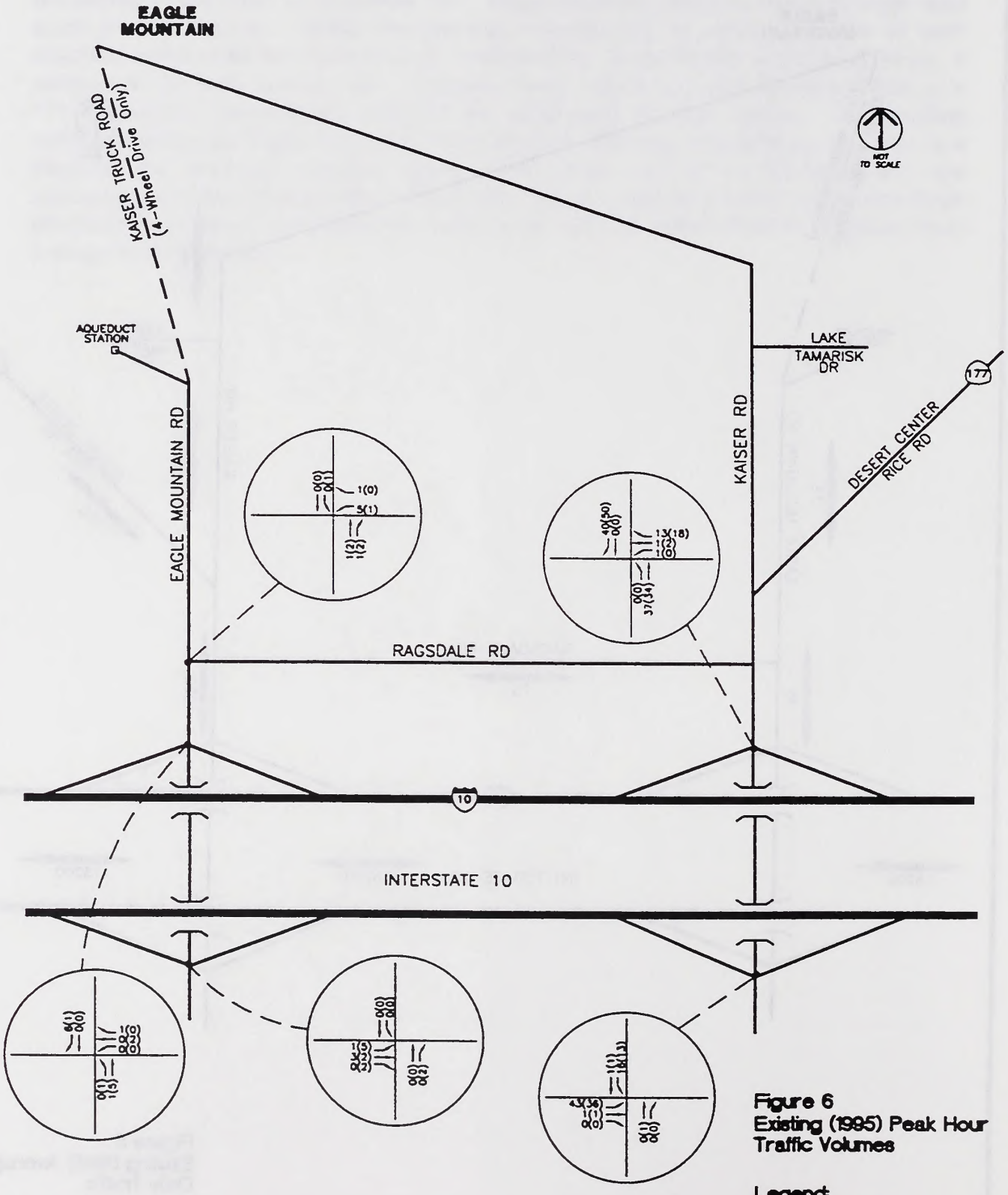


Figure 6
Existing (1995) Peak Hour Traffic Volumes

Legend:
XX(XX) - AM(PM)

Kaiser Road/Desert Center/Rice Road Interchange. Kaiser Road runs from north of the freeway north to the proposed Project site approximately eleven miles from the freeway. Kaiser Road intersects Desert Center/Rice Road north of the freeway. Access to Kaiser Road from the freeway is provided by the Desert Center/Rice Road interchange. Under the freeway overcrossing, the roadway is 40 feet wide curb-to-curb. The average daily traffic volumes at the interchange and on Kaiser Road are considerably higher than Eagle Mountain Road because of traffic related to the services in Desert Center, the residential population of Lake Tamarisk (approximately 550 people) and Desert Center (approximately 280 people), the operations at the Eagle Mountain site, and the existing school operations. Between Ragsdale Road and the freeway, Desert Center Rice Road carries 2,514 vehicles per day. Between Desert Center Rice Road and Lake Tamarisk Drive, Kaiser Road carries 424 vehicles per day; and north of Lake Tamarisk Drive it carries 286 vehicles per day.

Ragsdale Road. Ragsdale Road is a short, approximately 3-mile, two-lane roadway which connects Eagle Mountain Road with Kaiser Road. It runs immediately north of and parallel to the freeway. It is 36 feet wide, except at several bridges where it narrows to 24 feet. It has an ADT of approximately 75 vehicles per day.

2.4 Existing Roadway Segment Operations

Level of service calculations have been performed for the following roadway segments:

- Eagle Mountain Road north of Ragsdale Road
- Kaiser Road north of Desert Center Rice Road
- Kaiser Road north of Lake Tamarisk Drive

The results of this analysis are summarized in Table 5, and indicate that acceptable operations exist on all of these roadway segments. LOS definitions for roadway segments are summarized in the Table 6.

TABLE 5
1995 Existing Conditions - Roadway Segment LOS Analysis Summary

SEGMENT	PEAK HOUR VOLUME	LOS
Eagle Mountain Road n/o Ragsdale Road	12 (5:45 - 6:45 AM)	A
Kaiser Road n/o Desert Center Rice Road	51 (1:00 - 2:00 PM)	A
Kaiser Road n/o Lake Tamarisk Drive	49 (4:00 - 5:00 PM)	A

TABLE 6
Level of Service Definitions for Roadway Segments

LEVEL OF SERVICE	TRAFFIC FLOW CHARACTERISTICS
A	Average daily per vehicle ranges between 0 and 10 seconds. Nearly all drivers find freedom of operation. Very seldom is there more than one vehicle in the queue.
B	Average delay per vehicle ranges between 10 and 20 seconds. Some drivers begin to consider the delay an inconvenience. Occasionally there is more than one vehicle in the queue.
C	Average daily per vehicle ranges between 20 and 30 seconds. Many times there is more than one vehicle in the queue, and most drivers feel restricted, but not objectionably so.
D	Average delay per vehicle ranges between 30 and 40 seconds. Often there is more than one vehicle in the queue, and drivers feel quite restricted.
E	This represents a condition in which the demand is near or equal to the probable maximum number of vehicles that can be accommodated by the movement. Average delay per vehicle ranges between 40 and 60 seconds. There is almost always more than one vehicle in the queue, and drivers find the delays to be approaching intolerable levels.
F	Represents an intersection failure condition that is caused by geometric and/or operational constraints external to the intersection. In this situation, traffic flows are forced.

2.5 Existing Intersection Operations

The intersections most likely to be impacted by truck and automobile traffic related to the project are Eagle Mountain Road/Ragsdale Road, Eagle Mountain Road/Interstate 10 interchange and Desert Center Rice Road/Interstate 10 interchange. These are the intersection locations which will experience the greatest increase in traffic volume due to the project, and they have been analyzed to determine existing and forecast future operating conditions.

The level of service analysis for the interchanges of Interstate 10 with Eagle Mountain Road and Desert Center Rice Road indicates that LOS A (excellent) conditions exist for all movements during the peak hour. The intersection of Eagle Mountain Road/Ragsdale Road is also operating at LOS A. Table 7 shows the 1995 existing LOS summary at the five subject locations. LOS definitions for signalized intersections are summarized in Table 8. Traffic operations analysis worksheets are included in Appendix C.

TABLE 7
1995 Existing Conditions Intersection LOS Analysis Summary

INT #	INTERSECTION	AM PEAK DELAY	AM PEAK LOS	PM PEAK DELAY	PM PEAK LOS
1	Eagle Mountain Road/I-10 EB Ramps	3.3	A	2.7	A
2	Eagle Mountain Road/I-10 WB Ramps	0.3	A	1.0	A
3	Eagle Mountain Road/Ragsdale Road	2.4	A	1.0	A
4	Desert Ctr/Rice Road/I-10 EB Ramps	3.2	A	3.1	A
5	Desert Ctr/Rice Road/I-10 WB Ramps	0.6	A	0.6	A

TABLE 8
Level of Service Definitions for Signalized Intersections

LEVEL OF SERVICE	TRAFFIC FLOW CHARACTERISTICS
A	Very low average stopped delay, less than 5 seconds per vehicle. This occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
B	Average stop delay is in the range of 5.1 to 15.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.
C	Average stopped delay is in the range of 15.1 to 25.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
D	Average stopped delays are in the range of 25.1 to 40.0 seconds per vehicle. The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle length, or high volume/capacity ratios. Many vehicles stop and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	Average stopped delays are in the range of 40.1 to 60.0 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high volume/capacity ratios. Individual cycle failures are frequent occurrences.
F	Average stop delay is in excess of 60 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation. It may also occur at high volume/capacity ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may be major contributing causes to such high delay levels.

Note: A signal cycle failure is considered to occur when one or more vehicles are forced to wait through more than one green signal indication for a particular approach.

3. Future Year No-Build Conditions

3. FUTURE YEAR NO-BUILD CONDITIONS

The proposed landfill is not expected to operate at capacity until the 25th year of operation. This section of the report forecasts changes in existing conditions within the study area between now the years 2000, 2005 and 2010 which will allow comparison of conditions related to the transportation infrastructure both with and without the project. The estimation of project impacts will then be based on this comparison.

3.1 Future Conditions Related to Rail Transport

Rail line usage tends to change more slowly than highway usage, and significant changes in the amount and composition of rail traffic are not expected over the next five years. Continued growth in the southern California region is expected to result in increased traffic volumes at the at-grade crossings within the study area. The large region encompassed by the study area requires a generalized approach to estimating traffic growth within the study area.

3.1.1 Projection of Background Traffic Volumes

The Southern California Association of Governments (SCAG) periodically publishes projections of expected changes in the socioeconomic characteristics (i.e., population and employment) contributing to changing travel demand within the various parts of the region. SCAG's *1994 Regional Comprehensive Plan* specifically addresses growth in travel demand through the year 2015 for 15 individual subregions and six counties within SCAG's jurisdiction in the State of California.

Table 9 illustrates the projected annual traffic growth rates within California for key time periods, based on the population projections from SCAG. Annual growth between 1996 and 2005 was interpolated from growth rates for 1990-2000 and 2000-2010.

The growth rates determined here are then used to inflate the 1994 traffic volumes at the individual rail crossings to the years 1996 and finally 2010. This process can be seen by comparing vehicle volumes at specific rail crossings for 1994, 1996 and 2010 in Appendix B.

3.1.2 Projection of Background Train Volumes

Existing 1994 rail transportation volumes were obtained through interviews with representatives of the rail transportation companies and from reviews of Amtrak and Metrolink schedules. Projections of 1996 and 2005 background rail volumes were performed by R. L. Banks and Associates and were based primarily on the February 10, 1992 "*Southern California Accelerated Rail Electrification Program*" (Electrification report) draft report prepared for the Southern California Regional Rail Authority.

Information supplied in the Electrification report was adjusted to reflect comments obtained through interviews with representatives of the rail transportation companies.

TABLE 9
Study Area Traffic Growth Rate Summary

SEGMENT	SCAG COUNTY/ SUBREGION	POPULATION 1990	2000	2010	AVERAGE ANNUAL GROWTH 1990-1996[1]	1996-2005[2]
1, Riverside	Riverside	1,170,000	1,851,000	2,556,000	4.7%	3.3%
1, San Bernardino	San Bernardino	1,418,000	1,904,000	2,469,000	3.0%	2.6%
2, San Bernardino	San Bernardino	1,418,000	1,904,000	2,469,000	3.0%	2.6%
2, Los Angeles	Los Angeles	8,860,000	9,950,000	11,286,000	1.2%	1.3%
3, All	Los Angeles	8,860,000	9,950,000	11,286,000	1.2%	1.3%
4, All	Los Angeles	8,860,000	9,950,000	11,286,000	1.2%	1.3%
5, All	Los Angeles	8,860,000	9,950,000	11,286,000	1.2%	1.3%
6, All	Los Angeles	8,860,000	9,950,000	11,286,000	1.2%	1.3%
7, All	Los Angeles	8,860,000	9,950,000	11,286,000	1.2%	1.3%
8, All	Los Angeles	8,860,000	9,950,000	11,286,000	1.2%	1.3%

[1]This column is used to project growth to the intermediate year of 1996. Population projections for 1990 and 2000 were used to determine this rate.

[2]This column is used to project growth from 1996 to 2005. This rate was determined through interpolation of all three columns to arrive at 1996 and 2005 population projections and calculate a percentage growth rate or factor to go from 1996 to 2005.

Source: SCAG's 1994 Growth Management Chapter from the Regional Comprehensive Plan.

3.1.3 At Grade Crossing Delays

Background delays to individual at-grade crossings and segments have been calculated for all rail segments and are included in Appendix B. These calculations are summarized on a segment basis.

3.1.4 Relative Hazard Index

Background relative hazard indices have been calculated for all rail segments and are included in the Appendix. These calculations are summarized in Appendix B by individual crossings and segments. Note that for a given train and traffic volume, a lower level of protection at any given at-grade crossing yields a higher relative hazard index and a higher level of protection yields a lower relative hazard index. Higher traffic and train volumes yield higher relative hazard indices.

3.1.5 Future No-Build Delays to Highway Vehicles at At-Grade Crossings

The projected increases in traffic volumes within the study area will result in somewhat increased delays to vehicles when a train crosses any of the at-grade crossings located within the study area.

For year 2000 conditions, overall delays related to the passage of a single train of the same length as the proposed unit trains traveling to Eagle Mountain would result in a total of 153.8 minutes (2.56 vehicle-hours) of delay along the primary analysis segment, an increase of nearly 20% when compared to the estimate for existing conditions. The maximum number of vehicles affected at any one crossing on the primary segment would also increase under future no-build conditions. A total of 25 vehicles would be delayed at the Dillon Road crossing in Indio; whereas, only 20 vehicles would be affected under existing conditions. This is a 25% increase when compared to existing conditions.

Growth in the more urbanized regions of the study area results in increases in delay along the other rail segments studied. The increase in delay at a single crossing along the other secondary analysis segments would range from one to twenty percent between 1995 and 2000. At Slauson Avenue (Segment 5) the total delay increase was 1.5% (from 520.07 minutes to 527.71 minutes). The number of vehicles delayed, however, would rise 30%, from 977 vehicles to over 1300 vehicles.

In the year 2005, total delay along the primary segment will increase to 284.6 minutes (4.74 vehicle-hours, an increase of 85% over the five year period). The total delay to vehicles at the Dillon Road at-grade crossing would rise from 18.15 minutes to 31.34 minutes (an increase of 72.6% over the five year period). The number of vehicles delayed from rise from 24.6 vehicles to 69 vehicles.

For the year 2010, the total delay along the primary segment will increase to 305.6 minutes (5.09 vehicle-hours). This represents an increase of 7% over the five year period. Likewise, the total delay to vehicles at the Dillon Road at-grade crossing would rise to 33.19 minutes affecting 81 vehicles. These values represent a 6% increase in delay and a 17% increase in number of vehicles delayed at the Dillon Road crossing.

3.1.6 Rail Line Future No-Build Condition Hazard Index

The increased traffic volumes at study area at-grade crossings also affect the at-grade crossing hazard indices. The recalculated hazard indices range from 1 (H=1.13 for Hammond Road in Riverside County along the primary segment) to 178,558 (Slauson Avenue in Segment 5) in 2000. The highest values are again projected for at-grade crossings located within the heavily urbanized western regions of the study area.

Dillon Road is again the highest hazard location along the primary segment, with a calculated hazard index value, H = 40,511, a twenty percent increase over the existing condition hazard index (H = 33,712) at this location. This location has moved from the 37th highest hazard among locations studied to the 31st highest overall ranking. This is a result of the faster growth in this area when compared to the locations it surpassed, which are located in Los Angeles County.

Second highest hazard index location along the primary segment is 22nd Street (H = 39,595) representing an increase of 20% from the existing hazard index (H = 32,950).

The highest hazard location in Riverside County not protected by gates is still 50th Avenue in Coachella, where the estimated future no-build condition hazard index is estimated to be approximately 14,445. This value places 50th Avenue in the 47th rank overall. The future conditions without the project at-grade crossing analysis is contained in Appendix D.

In the year 2005, the highest hazard index along Segment 1 is Dillon Road with an increase of 97% to 80,165, based on a 137% increase in ADT in the five year period. Other segments which have high indices on the primary segment include 22nd Street and Airport Boulevard. In the San Bernardino County, Euclid Avenue (H = 272,928), Milliken Avenue (H = 129,016) and Vineyard Avenue (H = 111,647) are the three highest ranking grade crossings. In Los Angeles, Slauson Avenue tops the ranks with H= 360,153, an increase of 101% (from H = 178,558 in the year 2000).

Dillon Road still tops the list of highest hazard index along Segment 1 for the year 2010 with H = 87,154 (representing an increase of 115% from year 2005). For San Bernardino County, Euclid Avenue effected an increase to H = 311,869 (representing an increase of 14%) with Airport Road ranking second (H = 147,424, also representing an increase of 14%). Slauson Avenue in Los Angeles effected an increase of 22% (from H = 360,153 to H = 440,109). The impacts associated with these locations are not project related and require no mitigation by the project.

3.2 Future Conditions on Study Area Roadways

Before quantifying impacts of the proposed project on study area roadways, it is necessary to first identify future conditions without the project. Future years traffic volumes on surface roadways (all non-freeway) are forecast utilizing data contained in the Southern California Association of Governments (SCAG) Regional Comprehensive Plan (see previous section for further detail on methodology). Freeway traffic volumes have been forecast based on historical growth trends between 1980 and 1993. Comparison of Interstate 10 traffic volume counts for those years illustrates an overall growth of 48 percent, or a compounded rate of five percent per year. Projecting this rate forward to 2000 and 2005 yields a freeway growth rate of 41 percent.

Figures 7 and 8 illustrate forecast future ADT volumes on roadways and intersections near the project site. Roadway operations level of service analyses have been completed for this scenario using the estimated 2000 and 2005 traffic volumes. The roadway segment and intersection operations analysis for this scenario is presented in Table 10 and 11 for year 2000.

In the year 2005, figures 9 and 10 illustrate projected volumes for roadway segments and intersection analysis. Tables 12 and 13 indicate the LOS for 2005 for roadway segments and intersection analysis. Under future conditions, all intersections and roadway segments will operate at LOS A without the project.

Figures 11 and 12 illustrate the projected volumes for roadway segments and intersection analysis for the year 2010. Tables 14 and 15 summarize the LOS for 2010 analysis. All intersections and roadway segments will operate at LOS A without the project.

All traffic movements at the Interstate 10 interchanges with Eagle Mountain Road and Desert Center/Rice Road and the intersection of Eagle Mountain Road/Ragsdale Road are forecast to operate at LOS A with excellent operating conditions. Appendix E contains the traffic operations analysis worksheets for future conditions without the project.

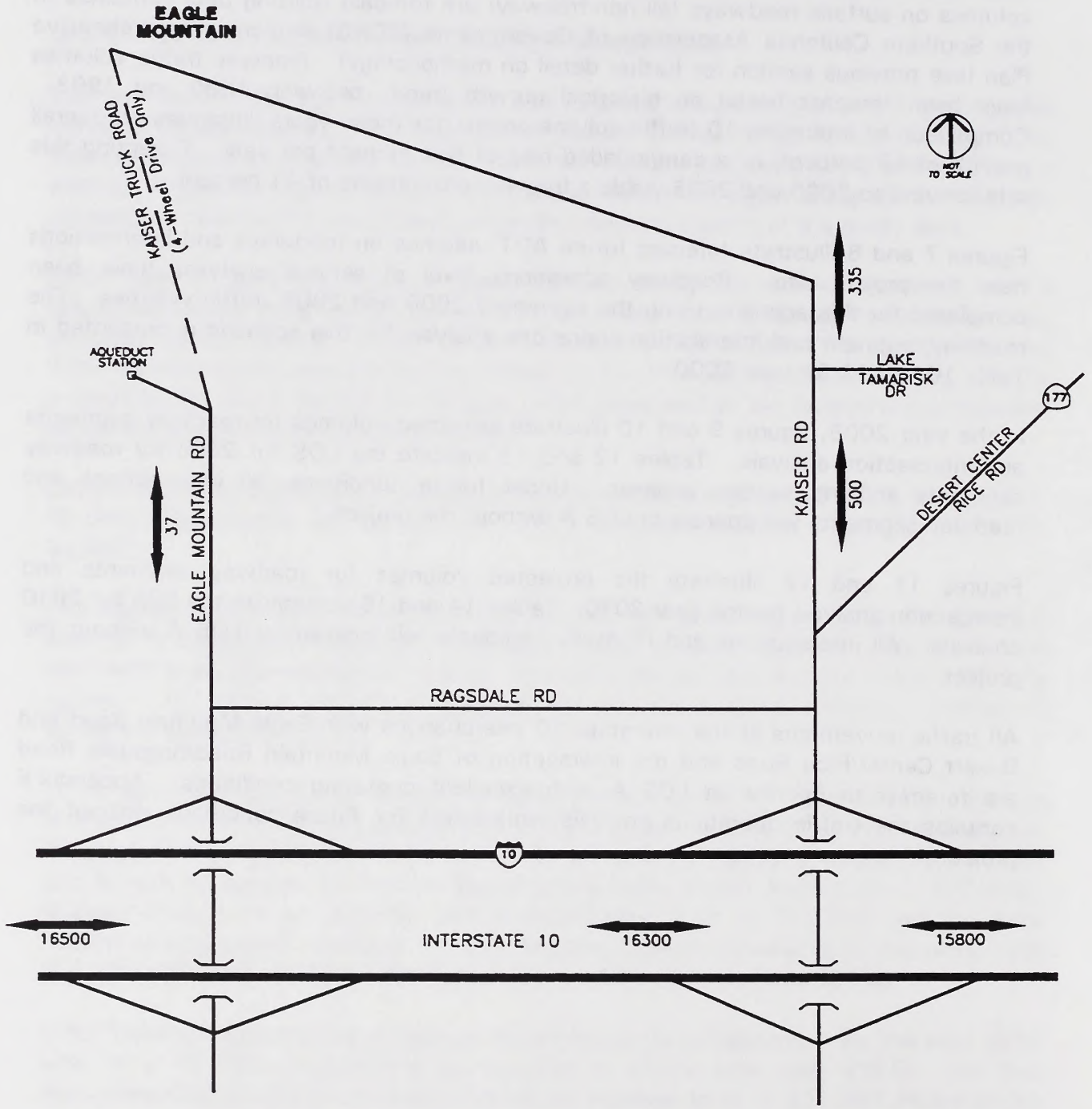


Figure 7
Forecast 2000 Average Daily Traffic (Without Project)

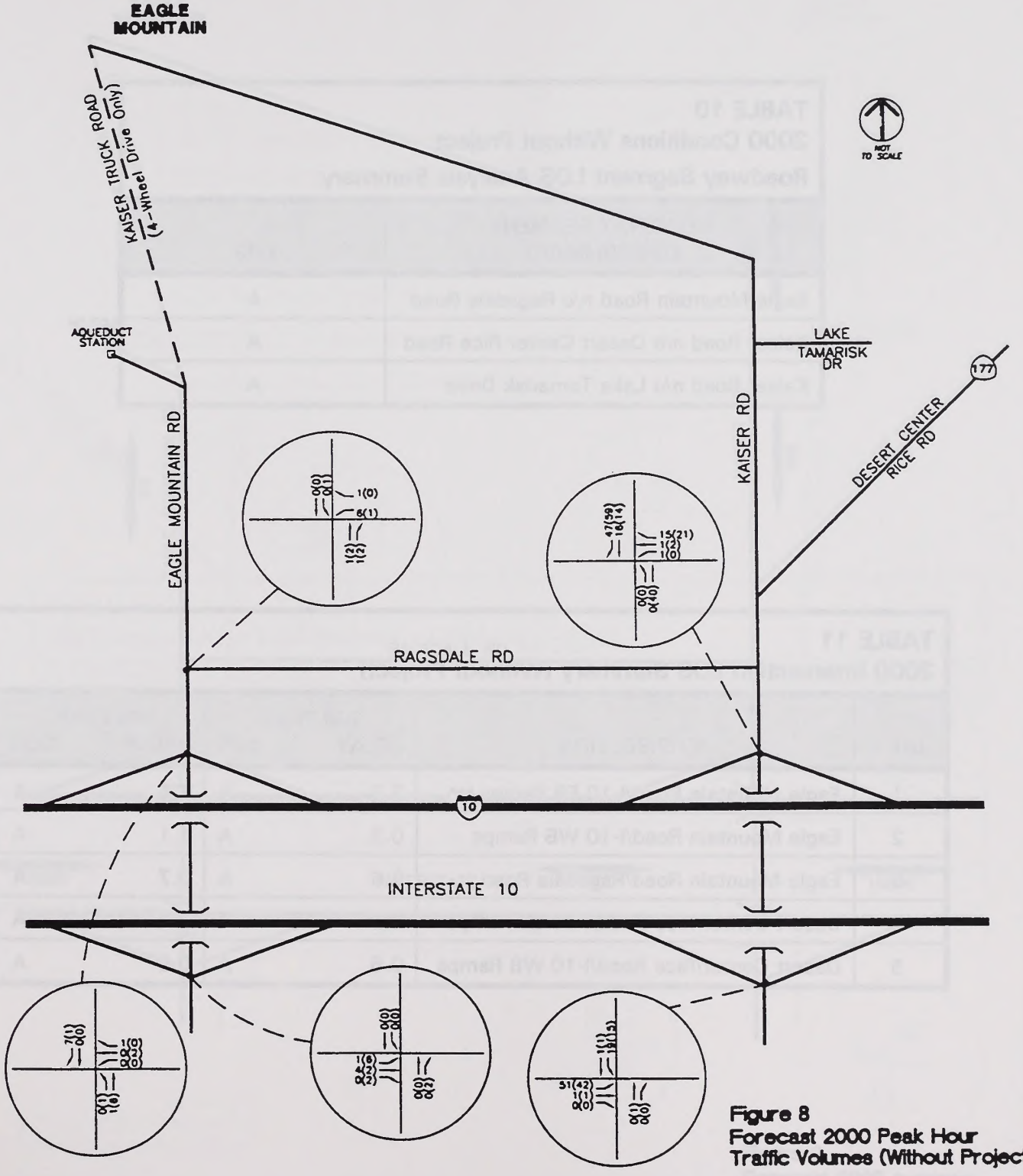


Figure 8
Forecast 2000 Peak Hour Traffic Volumes (Without Project)

Legend:
XX(XX) - AM(PM)

TABLE 10
2000 Conditions Without Project
Roadway Segment LOS Analysis Summary

ROADWAY SEGMENT LOS SUMMARY	LOS
Eagle Mountain Road n/o Ragsdale Road	A
Kaiser Road n/o Desert Center Rice Road	A
Kaiser Road n/o Lake Tamarisk Drive	A

TABLE 11
2000 Intersection LOS Summary (Without Project)

INT #	INTERSECTION	AM PEAK DELAY	AM PEAK LOS	PM PEAK DELAY	PM PEAK LOS
1	Eagle Mountain Road/I-10 EB Ramps	●.3	A	2.6	A
2	Eagle Mountain Road/I-10 WB Ramps	0.3	A	1.1	A
3	Eagle Mountain Road/Ragsdale Road	2.6	A	0.7	A
4	Desert Center/Rice Road/I-10 EB Ramps	●.3	A	3.2	A
5	Desert Center/Rice Road/I-10 WB Ramps	0.6	A	0.5	A

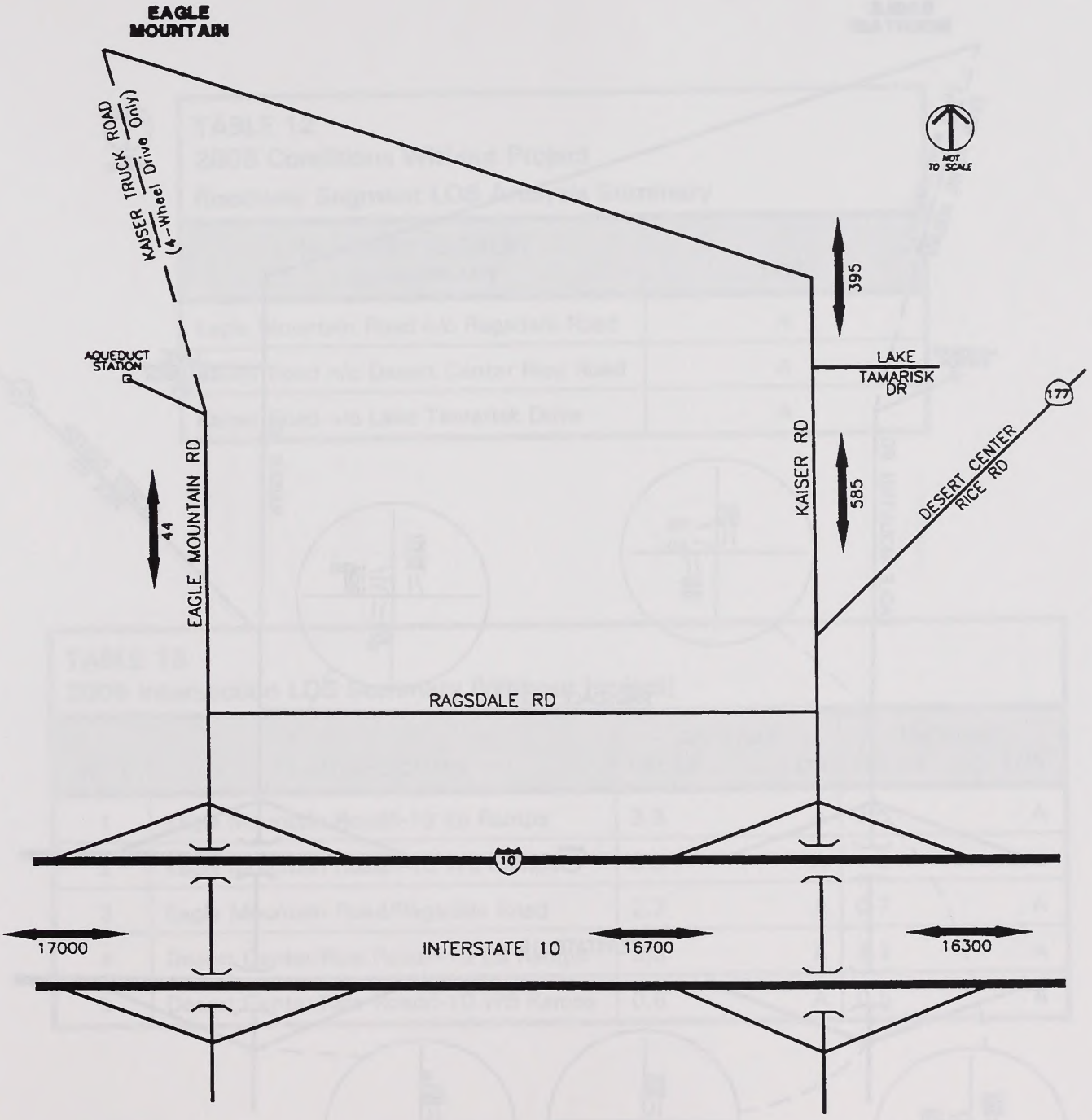


Figure 9
Forecast 2005 Average Daily Traffic (Without Project)

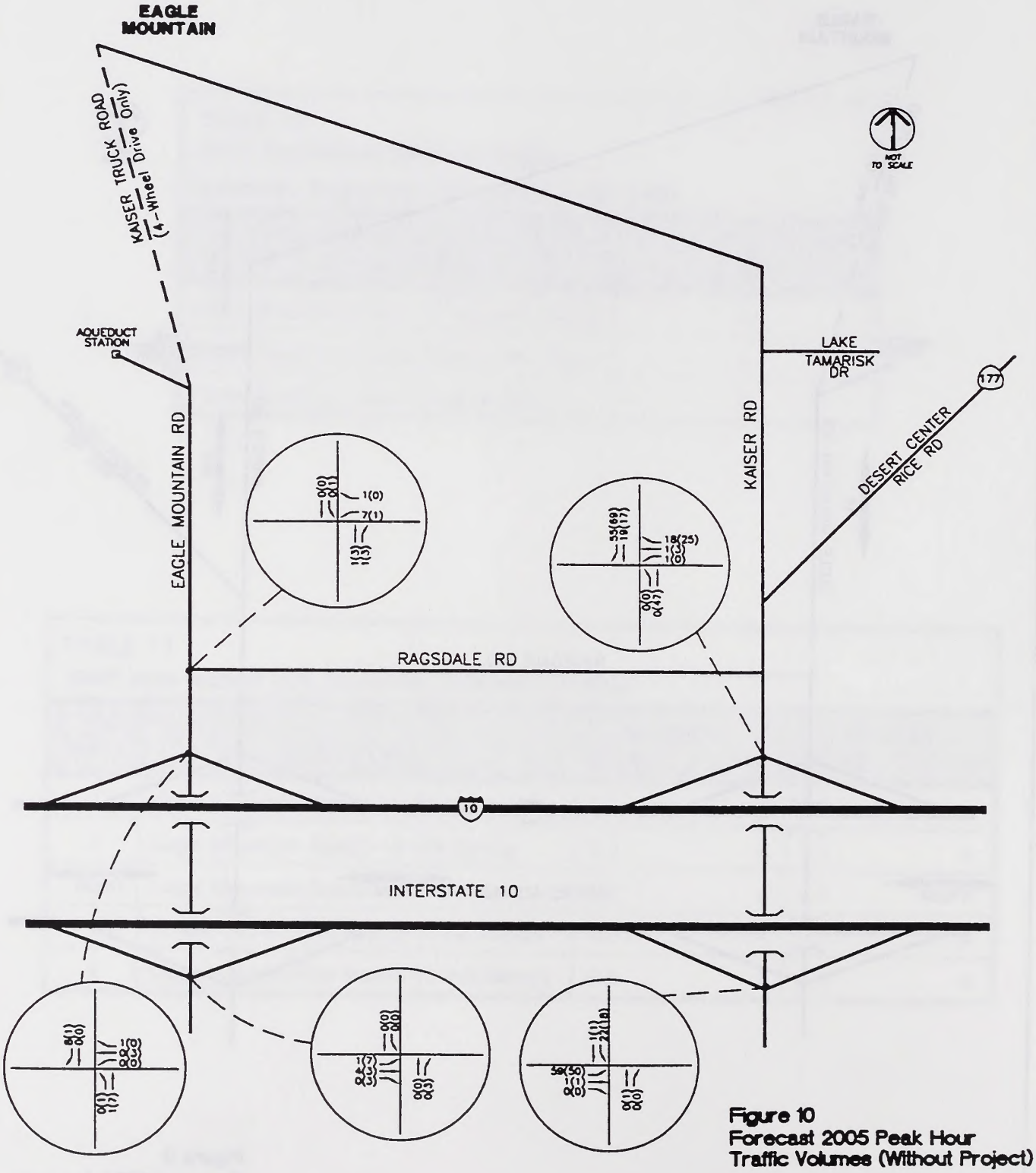


Figure 10
Forecast 2005 Peak Hour Traffic Volumes (Without Project)

Legend:
XX(XX) = AM(PM)

TABLE 12
2005 Conditions Without Project
Roadway Segment LOS Analysis Summary

ROADWAY SEGMENT LOS SUMMARY	LOS
Eagle Mountain Road n/o Ragsdale Road	A
Kaiser Road n/o Desert Center Rice Road	A
Kaiser Road n/o Lake Tamarisk Drive	A

TABLE 13
2005 Intersection LOS Summary (Without Project)

INT #	INTERSECTION	AM PEAK DELAY	AM PEAK LOS	PM PEAK DELAY	PM PEAK LOS
1	Eagle Mountain Road/I-10 EB Ramps	3.3	A	2.6	A
2	Eagle Mountain Road/I-10 WB Ramps	0.3	A	1.0	A
3	Eagle Mountain Road/Ragsdale Road	2.7	A	3.2	A
4	Desert Center/Rice Road/I-10 EB Ramps	3.3	A	3.2	A
5	Desert Center/Rice Road/I-10 WB Ramps	0.6	A	0.5	A

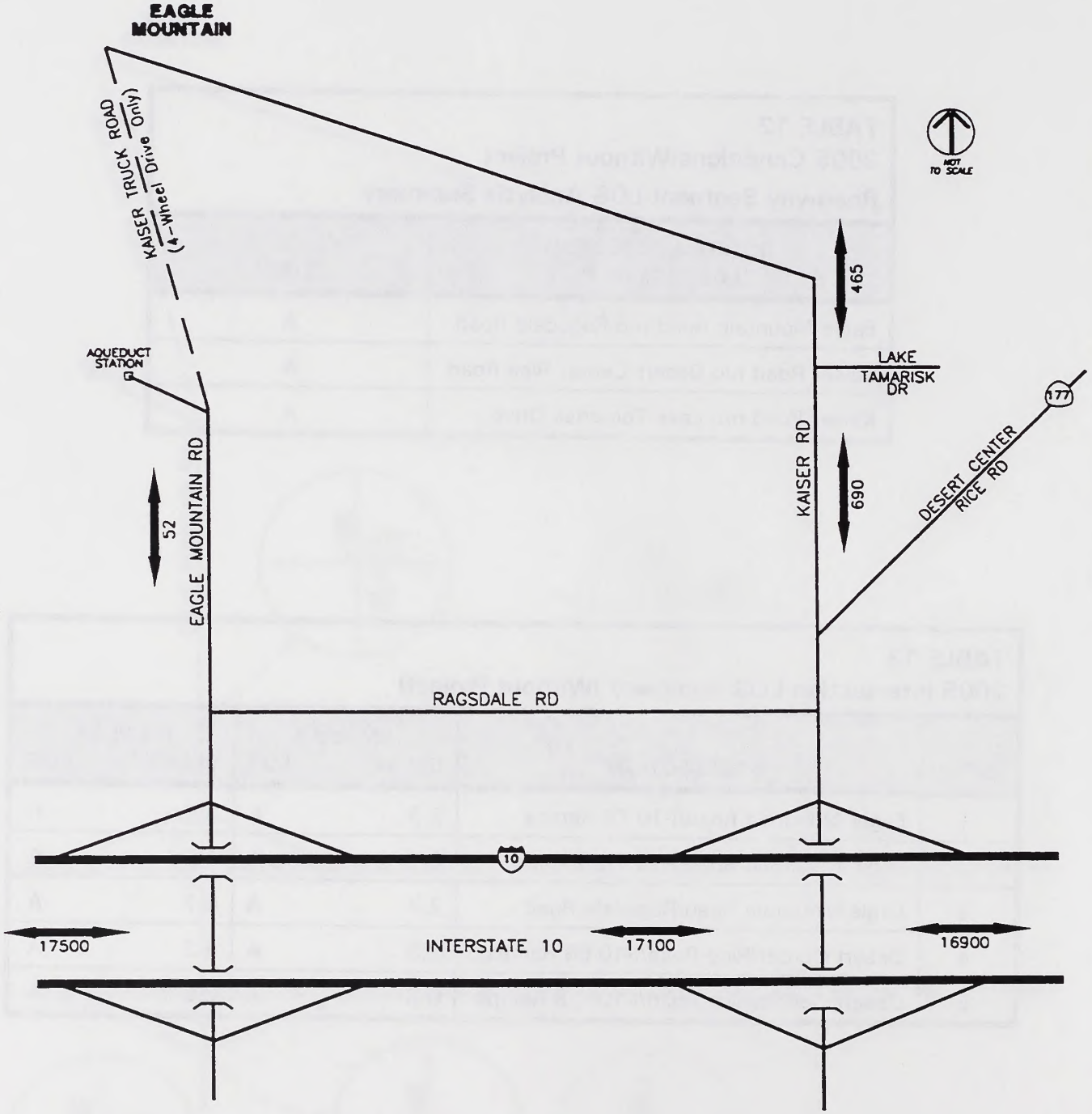


Figure 11
Forecast 2010 Average Daily Traffic (Without Project)

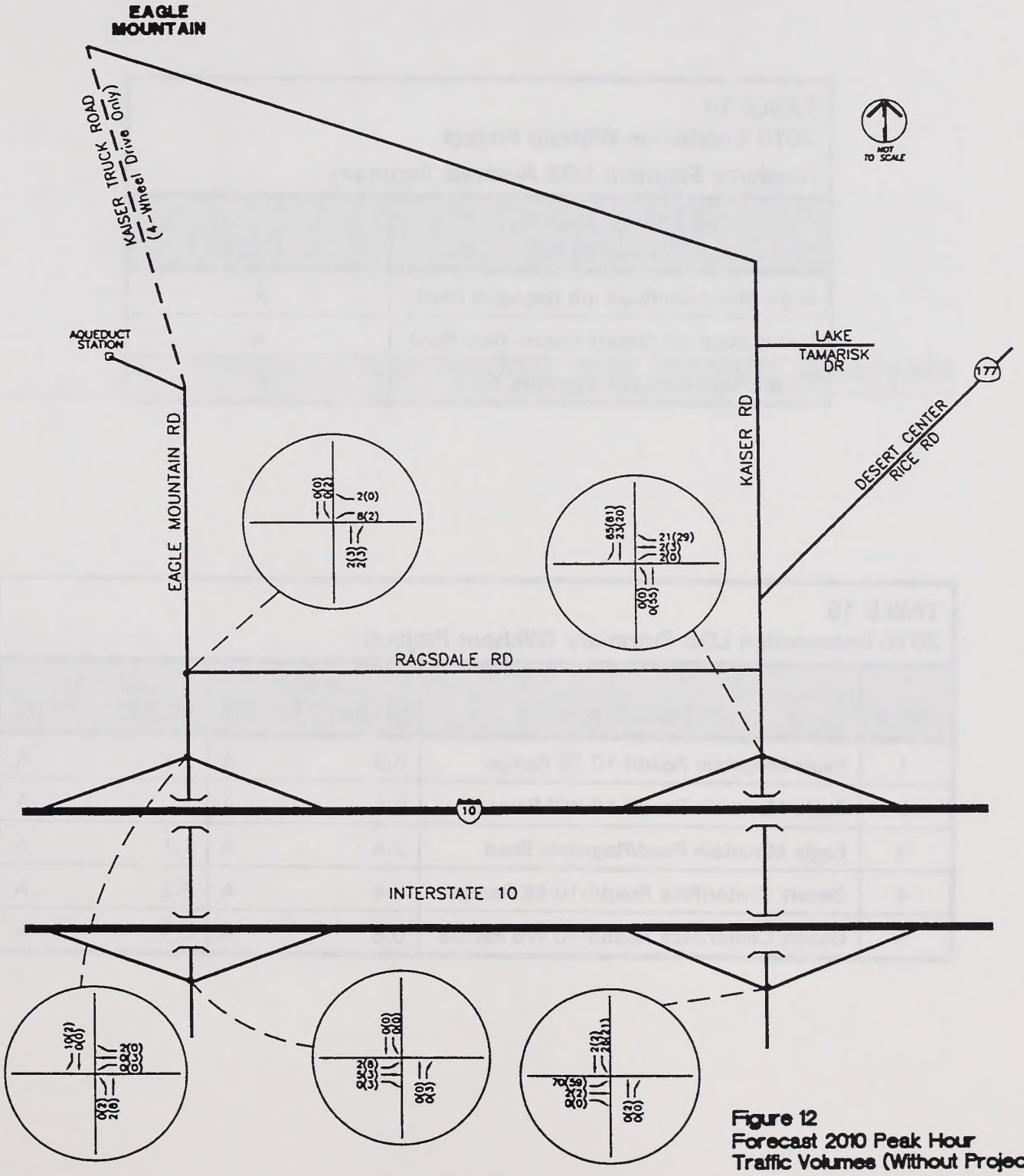


Figure 12
Forecast 2010 Peak Hour Traffic Volumes (Without Project)

Legend:
XX(XX) = AM(PM)

TABLE 14
2010 Conditions Without Project
Roadway Segment LOS Analysis Summary

ROADWAY SEGMENT LOS SUMMARY	LOS
Eagle Mountain Road n/o Ragsdale Road	A
Kaiser Road n/o Desert Center Rice Road	A
Kaiser Road n/o Lake Tamarisk Drive	A

TABLE 15
2010 Intersection LOS Summary (Without Project)

INT #	INTERSECTION	AM PEAK DELAY	AM PEAK LOS	PM PEAK DELAY	PM PEAK LOS
1	Eagle Mountain Road/I-10 EB Ramps	3.3	A	2.7	A
2	Eagle Mountain Road/I-10 WB Ramps	0.4	A	1.0	A
3	Eagle Mountain Road/Ragsdale Road	2.4	A	1.●	A
4	Desert Center/Rice Road/I-10 EB Ramps	●.4	A	3.2	A
5	Desert Center/Rice Road/I-10 WB Ramps	0.6	A	0.5	A

4. Project Description and Impact Analysis

4. PROJECT DESCRIPTION AND IMPACT ANALYSIS

The proposed Eagle Mountain landfill is expected to begin operations in the latter part of the 1990s, but it will not be operating at capacity until approximately the 25th year of operation. Table 16 summarizes the projected waste stream going into the site.

TABLE 16
Projected Waste Flow

Year	Trains per Day	Daily Tonnage by Train	Trucks per Day	Daily Tonnage by Trucks	Total Tonnage
1	1	3500	50	1000	4500
5	2	7000	50	1200	8200
10	3	10,500	80	1600	12,100
15	4	14,000	100	2000	16,000
25	5	17,500	100	2000	19,500

Source: Gary Johnson's Memorandum to Tom Peters on "Projected Waste Flow" dated October 6, 1995

The project description and impact analyses focus on the years 2000, 2005 and 2010. The project will eventually require realignment of both the Eagle Mountain Railroad and the Kaiser Truck Road. The proposed realignments will not take place until the facility is receiving more than a single refuse train per day. Table 16 estimates this to occur after about 5 years of operation. The proposed realignments are displayed in Figure 13. The impacts of these realignments also are discussed in this analysis.

This section of the report will follow the same format previously used, wherein the characteristics of the project and their impacts related to rail will be presented first, followed by the characteristics and impacts related to the roadway system. The impacts related to the proposed railroad and roadway realignments will be discussed last.

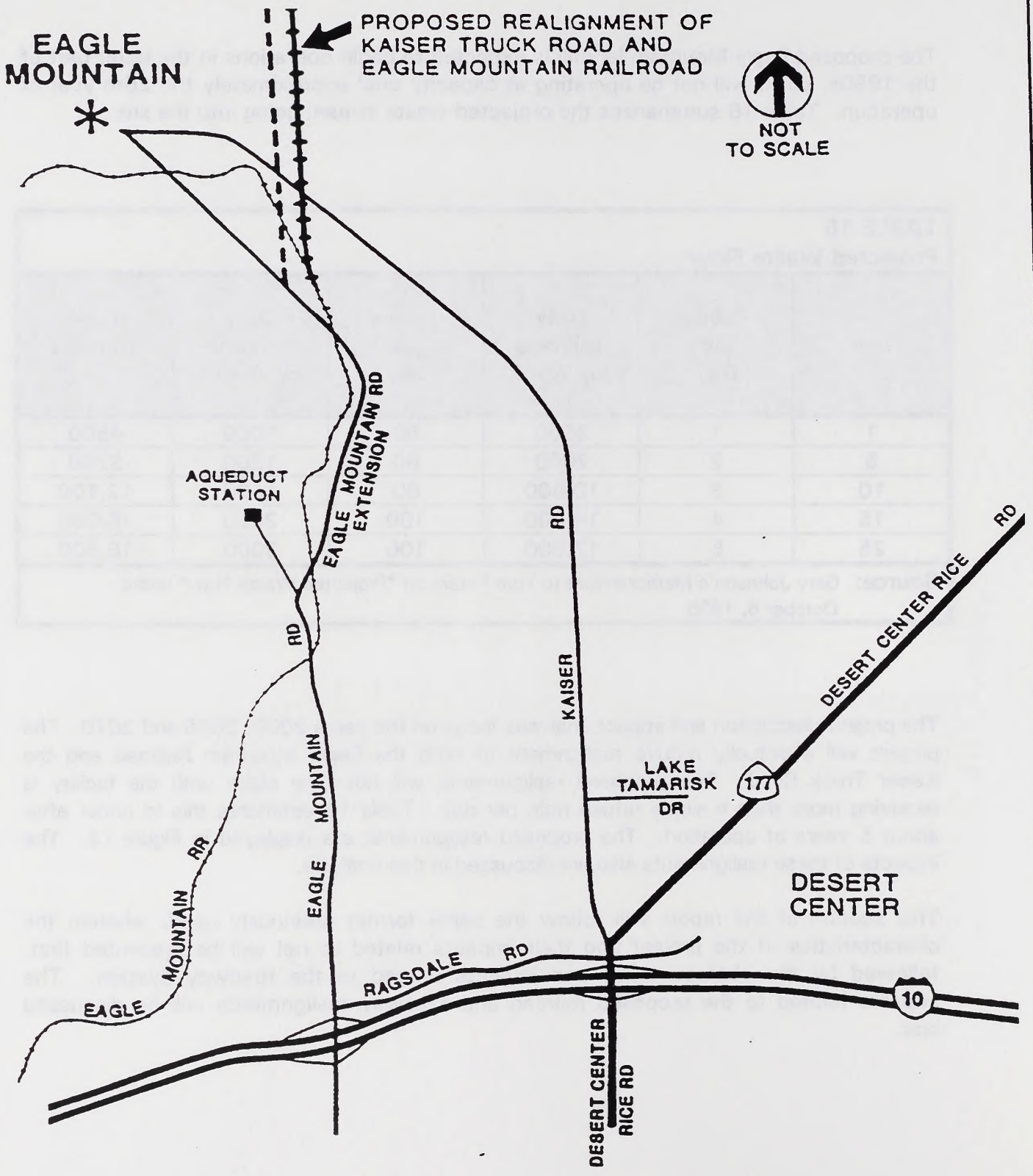


Figure 13
Proposed Roadway and Railway Acces

4.1 Project Description and Impacts - Rail Related Characteristics

A total of 20,000 tons of refuse will be delivered to the site daily via the rail and truck modes of transport, taking advantage of the existing rail spur providing service to the site. The spur, formerly used to carry iron ore from the site to various off-site locations, was originally designed to service trains significantly heavier than the proposed refuse unit trains.

The unit trains will consist of one or more diesel locomotives pulling fourteen articulated rail cars. The rail cars will be "twin stack," as manufactured by Gunderson and Greenbriar Intermodal. Each car will be 256 feet long and consist of five articulating units, each with a well-type configuration capable of holding two 40-foot by 8-foot by 8-foot containers (for a total capacity of ten containers). The estimated length of the overall train, including the engine(s), is 8,000 feet or less. A single train could transport approximately 3,500 tons of waste.

A total of six transfer stations is expected to serve as locations where refuse will be consolidated and loaded into containers for delivery to the site. The locations of these transfer stations were previously presented in Figure 2 (Chapter 1). The quantity of waste to be handled at each transfer station and the resulting average number of shipments per day and per week are presented in Table 17. Although an average of 4.7 shipments per day is projected, the marshalling yard will be equipped to handle the arrival of up to six trains per day.

TABLE 17
Average Number of Shipments by Transfer Station

STATION	TONS PER DAY (AVERAGE)	AVERAGE DAILY NUMBER OF SHIPMENTS	AVERAGE WEEKLY NUMBER OF SHIPMENTS
San Bernardino County	2,000	0.6	3.5
La Verne	2,000	0.6	3.5
Industry	2,000	0.6	3.5
Irwindale	3,000	0.9	5.1
Los Angeles	5,000	1.4	8.6
Orange County	2,000	0.6	3.5
TOTAL	**16,000**	**4.7**	**27.7**

4.1.1 Estimated Project Impacts on At-Grade Crossing Delays

The shipments from each transfer station would use one or more of the rail segments defined to reach the landfill. For instance, the San Bernardino County transfer station would utilize Segment 1 of the rail system to transport refuse to the Eagle Mountain landfill, and the resultant delays would apply only to traffic using at-grade crossings along this rail segment.

The La Verne and Irwindale transfer stations could potentially ship refuse to the landfill via more than a single route. For instance, the containers from the La Verne transfer station could be shipped directly west to Eagle Mountain via Segment 1 and Segment 6, or shipments from this transfer station could also be routed through Bassett Junction to the landfill, via Segments 1, 2, 3, 7, and 8. The routes analyzed in the delay analysis are presented in Table 18.

Each shipment to the landfill would necessitate two one-way train trips. A shipment of full containers to the site and a return train delivering empty containers for reuse at the transfer station would both be required. Multiplying the average daily number of trains by the estimated at-grade crossing delays for each segment traversed on a particular route yields the average daily delay caused by shipments from each transfer station. The average daily delays by transfer station are summarized in Table 19.

TABLE 18
Routes from Transfer Stations to Eagle Mountain Landfill

	Segments Used								
Transfer Station	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
San Bernardino County	X								
La Verne (Route 1)	X					X			
La Verne (Route 2)	X	X	X				X	X	
Industry	X	X							
Irwindale (Route 1)	X					X	X		
Irwindale (Route 2)	X	X	X					X	
Los Angeles	X	X	X	X					
Orange County	X	X	X	X	X				
San Diego									TBD

TABLE 19
Delays Caused by Shipments from Each Transfer Station

Transfer Station	2000 Resulting Average Daily Delay (Hours)	2005 Resulting Average Daily Delay (Hours)	2010 Resulting Average Daily Delay (Hours)
San Bernardino Co.	3.52	6.43	6.89
La Verne (Route 1)	11.58	19.98	22.01
La Verne (Route 2)	13.56	23.08	25.24
Industry	9.32	16.16	17.67
Irwindale (Route 1)	21.82	37.74	41.84
Irwindale (Route 2)	15.89	26.85	29.03
Los Angeles	46.56	67.42	66.59
Orange County	132.38	158.96	135.45
San Diego	TBD	TBD	TBD

The shipments from the La Verne and Irwindale transfer stations result in significantly lower delays when routed west through Bassett Junction, then east on the Yuma/Alhambra line to Eagle Mountain. Assuming this routing, shipments from the Orange County transfer station would cause much greater at-grade crossing delays than the other proposed transfer stations. This is a result of the proposed rail route, which traverses some of the most heavily urbanized areas in the region and also requires slower train speeds.

The delays from the Orange County shipments are still relatively minor compared to the delays projected for facilities such as the Ports of Los Angeles and Long Beach. The SCAG report which assesses the potential for rail transport of waste to distant locations states that the high train volumes, slow speeds, and proposed daytime operations result in delay estimates of 100 to 300 vehicle-hours of delay at individual grade crossings.[1] This report also categorizes delays of the magnitude estimated for the Eagle Mountain landfill as "relatively minor."

Another perspective on the significance of the expected total delay incurred along the rail line is also mentioned in the previously cited SCAG report. The report indicates that the approximate average daily delay at the intersection of two arterials carrying 20,000 vehicles per day would be an estimated 300 hours of delay, or five times the total average daily delay caused by the transport of refuse via rail to the Eagle Mountain landfill.

[1] *The Feasibility of Hauling Solid Waste by Railroad from the San Gabriel Valley to Remote Disposal Sites*, Southern California Association of Governments, April, 1988.

In summary, if the optimal routes from the Irwindale and La Verne transfer stations were used, the total average daily delay at the rail line at-grade crossings would be 219.3 hours (year 2000). Total delay along the primary segment, (i.e., from Eagle Mountain Landfill to Colton) would average approximately 27 hours per day, with a maximum average delay at any grade crossing of between one and two minutes per vehicle along this segment.

The Project-related use of rail transport is not expected to have a significant impact on the rail lines and surrounding infrastructure. When operating at maximum daily capacity, the landfill would receive an average of five shipments of refuse per day, which would result in 10 shipments because each shipment will require the delivery of full containers and the return of empty containers. All 10 trains per day will use the primary analysis segment (Segment 1), with lesser increases in train traffic along each of the other segments included in the analysis.

The impact of the Project on delays to vehicles using at-grade crossings is minimal, and therefore, not considered to be a significant impact. Average vehicle delays of 1 to 2 minutes can be expected for each train in the County of Riverside; and fewer than 23 vehicles would be affected at any one crossing in the County other than Dillon Road in Indio, where 24 vehicles (in the year 2000, 69 vehicles in the year 2005, and 81 vehicles in the year 2010)) would be delayed by the passage of a single refuse train.

A total of fewer than 220 hours (year 2000) of delay to vehicles encountering refuse unit trains when using at-grade crossings is expected on an average daily basis. Most of this delay would occur along Segment 5, servicing northern Orange County, where a combination of high traffic volumes and low train speeds results in much higher delays than along other rail segments.

4.1.2 Estimated Project Impacts on At-Grade Crossing Hazard Indices

The proposed landfill at Eagle Mountain also increases the hazards inherent whenever a railroad line crosses a highway at-grade. The increase occurs because of the projected increase in the amount of train traffic along the various rail lines. This section quantifies the expected change by recalculating the hazard indices previously presented for future conditions without the project, including the increased rail traffic, and compares the recalculated hazard index values and rankings to the values and rankings obtained in the analysis of future conditions without the project for the three analysis years (2000, 2005 and 2010).

The recalculated hazard indices for the year 2000 ranged from a low of 15 (Ramon Boulevard/Dowling Avenue and Francisquito Avenue, both in the City of Baldwin Park) to a high of 191,312 (Slauson Avenue in Los Angeles). The highest ranking crossing on the primary analysis segment is Dillon Road which experienced a 4.8% increase (from H = 40,511 without the project to H = 42,440 with the project) in the hazard index value.

For the year 2005, the hazard index values range from 30 (Ramon Boulevard/Dowling Avenue and Francisquito Avenue) to 385,879 (Slauson Avenue). The hazard index for Dillon Road rose from 80,165 without the project to 85,981 with the project representing an increase of 7.1%.

For the year 2010, the hazard index value range from 37 to 455,827 for the same streets. The hazard index for Dillon Road rose from 87,154 without the project to 95,455 with the project (an increase of 9.5%).

The calculated hazard indices for 22nd Street for the three analysis years with the project are: H = 41,480 for the year 2000, H = 83,949 for the year 2005 and H = 93,296 for the year 2010. These represent increases of 4.8%, 7.1% and 9.6% respectively for the three analysis years, when compared to the hazard indices without the project.

The overall effect of the project on the hazard indices of the study area at-grade crossings is to increase the values by 5% to 30% without significantly altering the overall rankings of the various at-grade crossings. The reason no major change in the overall rankings of the various at-grade crossings occurs is that the net increases in train traffic resulting from the project, while different for the various rail segments analyzed, tend to be proportional to the baseline train traffic on each segment.

Segment 1, where the greatest increase in train traffic occurs, is also the most heavily traveled segment initially. The proportional effect of five trains on the hazards along this segment are therefore very similar to the proportional effect of one or two trains on less heavily traveled rail segments in Orange or Los Angeles counties.

4.1.3 Summary of Rail Related Impacts

The project related usage of rail transport is expected to have a minimal impact on the rail lines and surrounding infrastructure. When operating at maximum daily capacity, the project will receive an average of five to six shipments of refuse per day, generating double this number of trains, as each shipment will require both the delivery of full containers and the return of empty containers. All 12 trains per day will utilize the primary analysis segment (Segment 1), with lesser increases in train traffic along each of the other segments included in the analysis.

The project is not expected to have a significant impact on safety within the study area. The forecast increase in background highway traffic volumes between 1995 and 2010 as a much greater effect on the calculated hazard indices for the at-grade crossings analyzed than the project related increase in train traffic. The project will not significantly affect the ranking of crossings along the primary analysis segment when compared to other crossings included in the safety analysis, nor will any Riverside County crossing reach the top seven percent threshold defined as indicating a deficient condition. Therefore, there is no significant rail safety impact associated with this project.

4.2 Project Description and Impacts - Highway System Related Characteristics

The proposed landfill will impact the highway system in two primary ways: (1) some of the waste delivered to the site will be transported via truck and (2) the landfill will generate new employment that results in additional activity at the Townsite. Both of these have the potential to impact the highway system in the vicinity of the Project. Each of these effects is examined in detail. The roadways in the seven-county, waste-shed area are shown in Figure 14, and the roads in the immediate vicinity of the Project site as shown in Figure 15.

The Project is expected to accept 20,000 tons per day of municipal solid waste. It is anticipated that half of this waste will come from within Riverside County, and the other half will be transported to the landfill from San Bernardino County transfer station. The typical trucks arriving at the site are expected to be carrying containers identical to the containers arriving by train. A small amount of trash, less than 5%, from local areas could arrive via conventional transfer trailers.

Approximately 100 truck shipments per day would be required to deliver refuse to the landfill in intermodal transfer containers. The trucks could arrive at any time of day, as the marshalling yard will be operational 24 hours a day. It is estimated that 10 percent of traffic will occur at the peak hour. This would translate to 10 incoming and 10 outgoing trips during the peak period.

All trucks would be required to use the Eagle Mountain Road extension (formerly the Kaiser Truck Trail; see Figure 15) via Eagle Mountain Road under normal circumstances for shipment delivery. The project applicant will identify the truck routes to the project and publish the correct routes for the haulers, the route will be signed as a truck route to the freeway. Almost all of the waste is expected to come from the more urbanized western regions of Riverside and San Bernardino Counties, where most of the refuse from these counties is generated.

The landfill is expected to employ approximately 163 people. The specific trip generation data for the proposed Project are based on the Institute of Transportation Engineers' (ITE) *Trip Generation Manual, Fifth Edition* (Institute of Transportation Engineers, 1994). Using this source, the land use category General Light Industry (ITE land use code 110) is most applicable in this instance.

The daily traffic volume related to traffic other than the trucks delivering refuse to the site is slightly less than 500 total daily trips, or 250 inbound and 250 outbound trips. Based on relative population densities, it is estimated that 85 percent of the trips will be to and from the west, while 10 percent have origins or destinations to the east, and 5 percent travel to and from the north on Desert Center/Rice Road. These trips would include both employee travel to and from work, and trips made by delivery vehicles, service vehicles, and other traffic to and from the Project site.

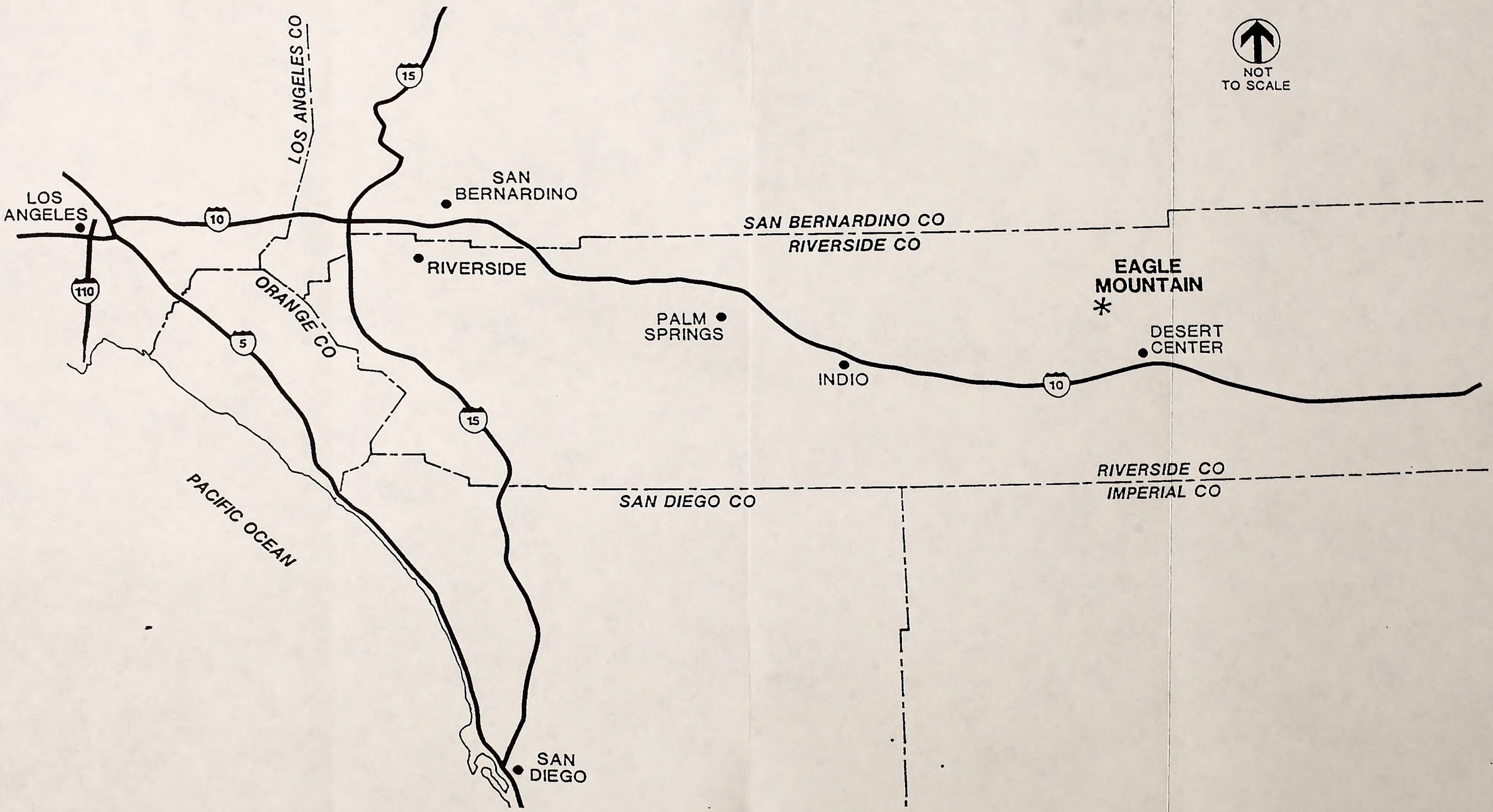


Figure 14
Roadway Network

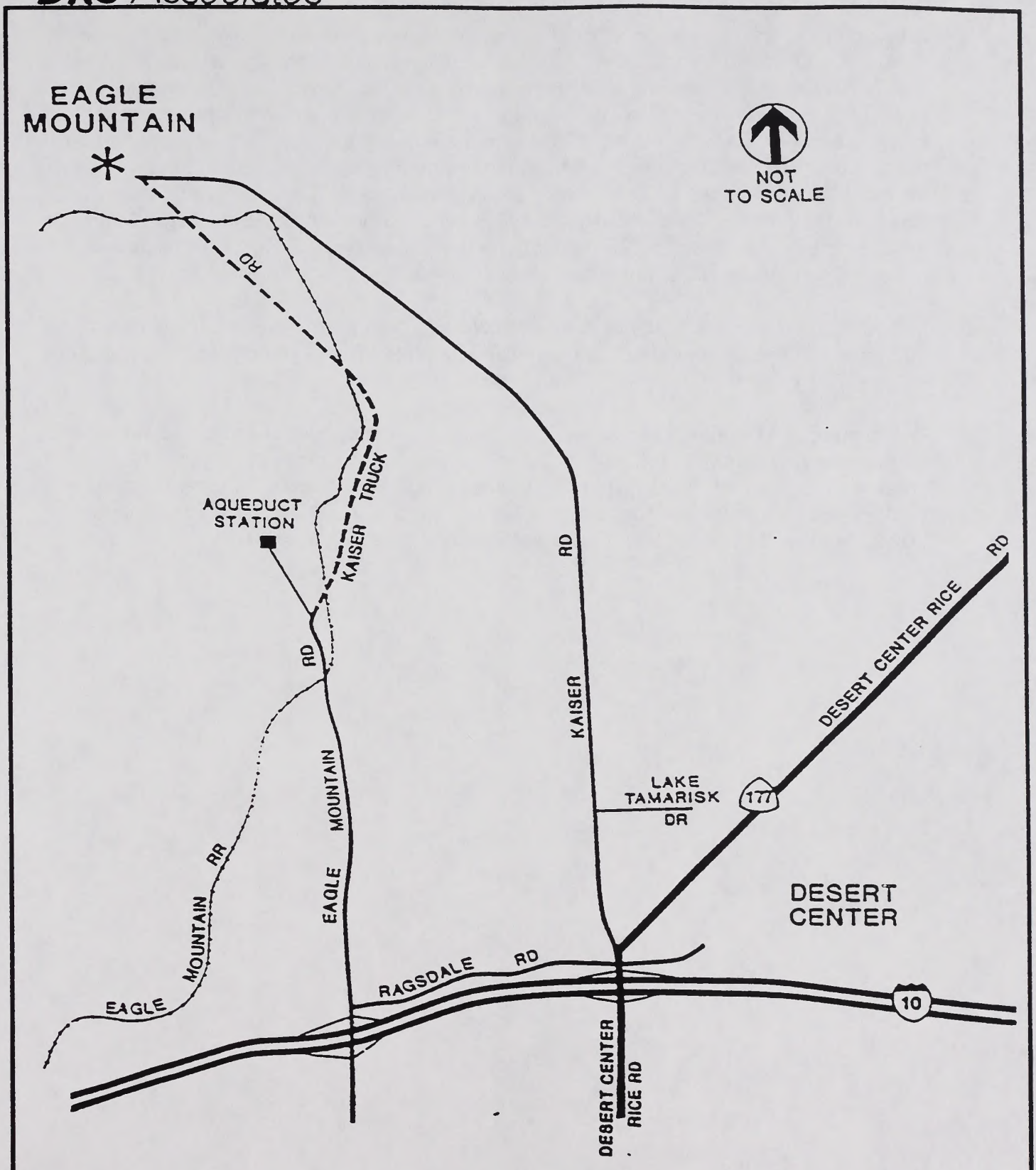


Figure 15
Roadways in Project Site and Vicinity

Although long-term relocation of employees to the Townsite would likely result in some trips terminating within the vicinity of the landfill and the Townsite, all traffic entering the Townsite was conservatively assumed to exit the Townsite. For instance, the residential area located near the landfill will be renovated, and the relocation of employees to this area could significantly reduce the peak hour traffic associated with the landfill. Truck traffic into the landfill is restricted to Eagle Mountain Road. All other traffic will gain access to the Project site via both Eagle Mountain Road and Kaiser Road. Approximately 75 percent of the Townsite traffic will be using Eagle Mountain Road whereas the remaining 25 percent will use Kaiser Road[2]. Figure 16 illustrates the projected trip directional distribution for the Townsite.

In addition, trip generation has been calculated, based on the specific plan for the Townsite. This trip generation is summarized in Table 20 and is included in the analysis as part of the Project.

The assumptions outlined above form the basis for distribution of Project-related traffic to the roadway network for both daily and peak hour conditions. Figures 17 and 18 present the expected 2000 build-out conditions daily traffic volumes (average daily and peak hour) on study area roadways. Figures 19 and 20 show build-out volumes for 2005. Figures 21 and 22 show build-out volumes for the year 2010.

[2] Per DKS Associates Telephone Conference call with Tom Peters of CH2MHill and Orlo Anderson of MRC, November 29, 1995.

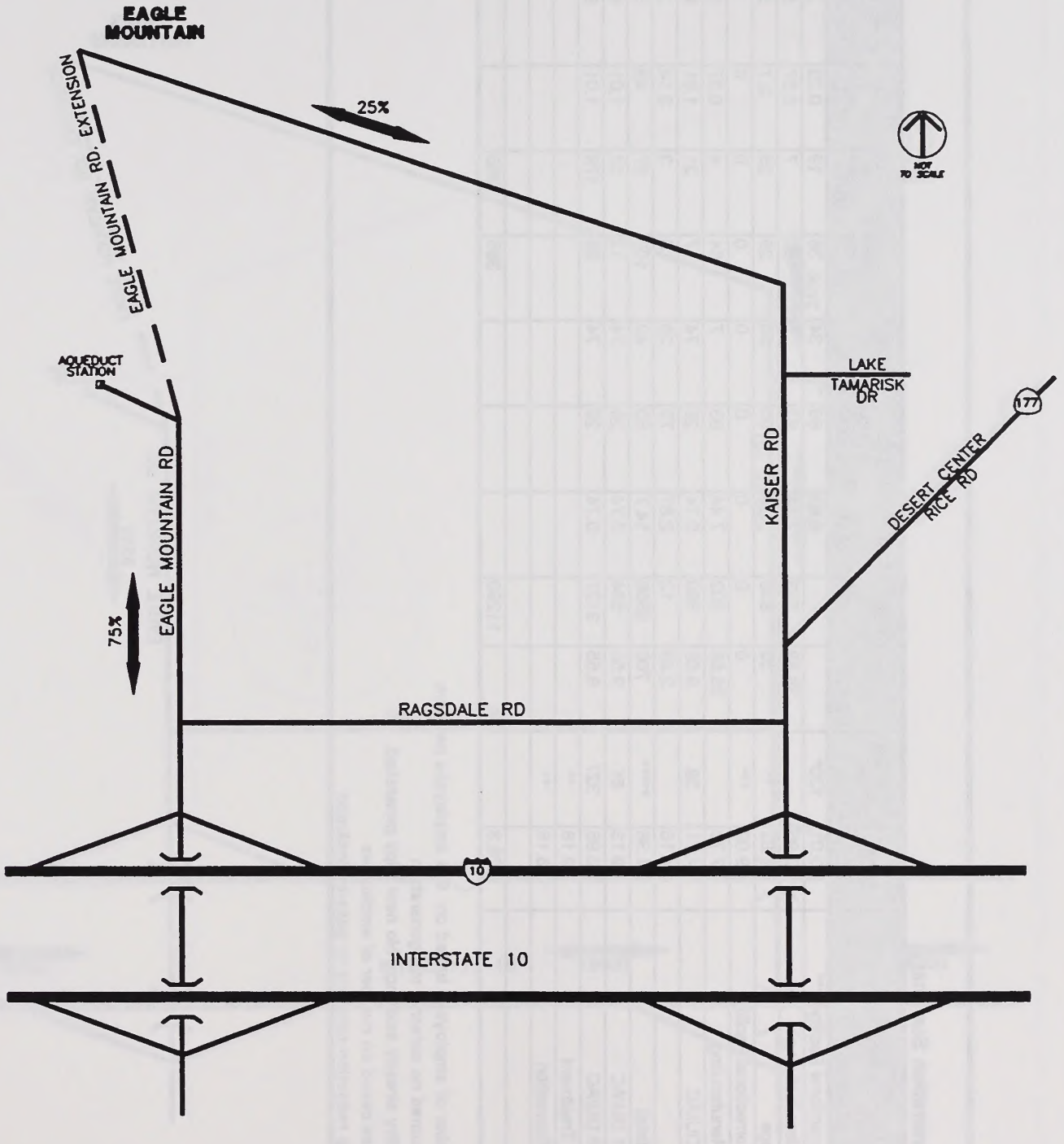


Figure 16
Project Trip Directional Distribution (Townsite)

TABLE 20
Townsite Trip Generation Summary

LOT NO.	LAND USE	SIZE (AC)	UNITS	ADT RATE	ADT	AM PEAK					PM PEAK				
						RATE	SPLIT % IN	SPLIT % OUT	TRIPS IN	TRIPS OUT	RATE	SPLIT % IN	SPLIT % OUT	TRIPS IN	TRIPS OUT
1	Eagle Mtn Correctional Facility ****	13.01	130*			0.42	66	34	36	19	0.23	28	72	8	22
2	Commercial/Manufacturing	12.95		38.88	503	7.44	93	7	90	7	8.37	53	47	57	51
3	Outdoor Storage	27.82	**	30	835	1.8	50	50	25	25	2.7	50	50	36	38
4	Community Correctional Facility	9.09	***	0	0	0	0	0	0	0	0	0	0	0	0
5	Commercial/Manufacuting	7.78		38.88	302	7.44	53	7	54	4	8.37	53	47	35	31
6	Residential 8 DU/AC	4.71	38	9.55	360	0.74	26	74	7	21	1.01	64	36	24	14
7	Recreation	4.16		2.99	12	2.87	72	28	0	0	3.14	35	65	5	8
8	Commercial/Retail	11.36	*****	700	5566	14.7	60	40	100	67	40	50	50	278	278
9	Residential 2.1 DU/AC	29.13	61	9.55	584	0.74	28	74	12	33	1.01	64	36	40	22
10	Residential 3.6 DU/AC	90.95	327	9.55	3127	0.74	26	74	63	179	1.01	64	36	212	119
11	Waste Water Treatment	49.18	**												
12	Open Space Recreation	168.16	**												
		428.3			11290				395	358				696	582

Notes:

* = number of employees based on 9.9 employees per acre

** = assumed no external trip generation

*** = facility already existing. No new trips generated.

**** = rates based on number of employees

***** = trip reduction rate due to pass-by included

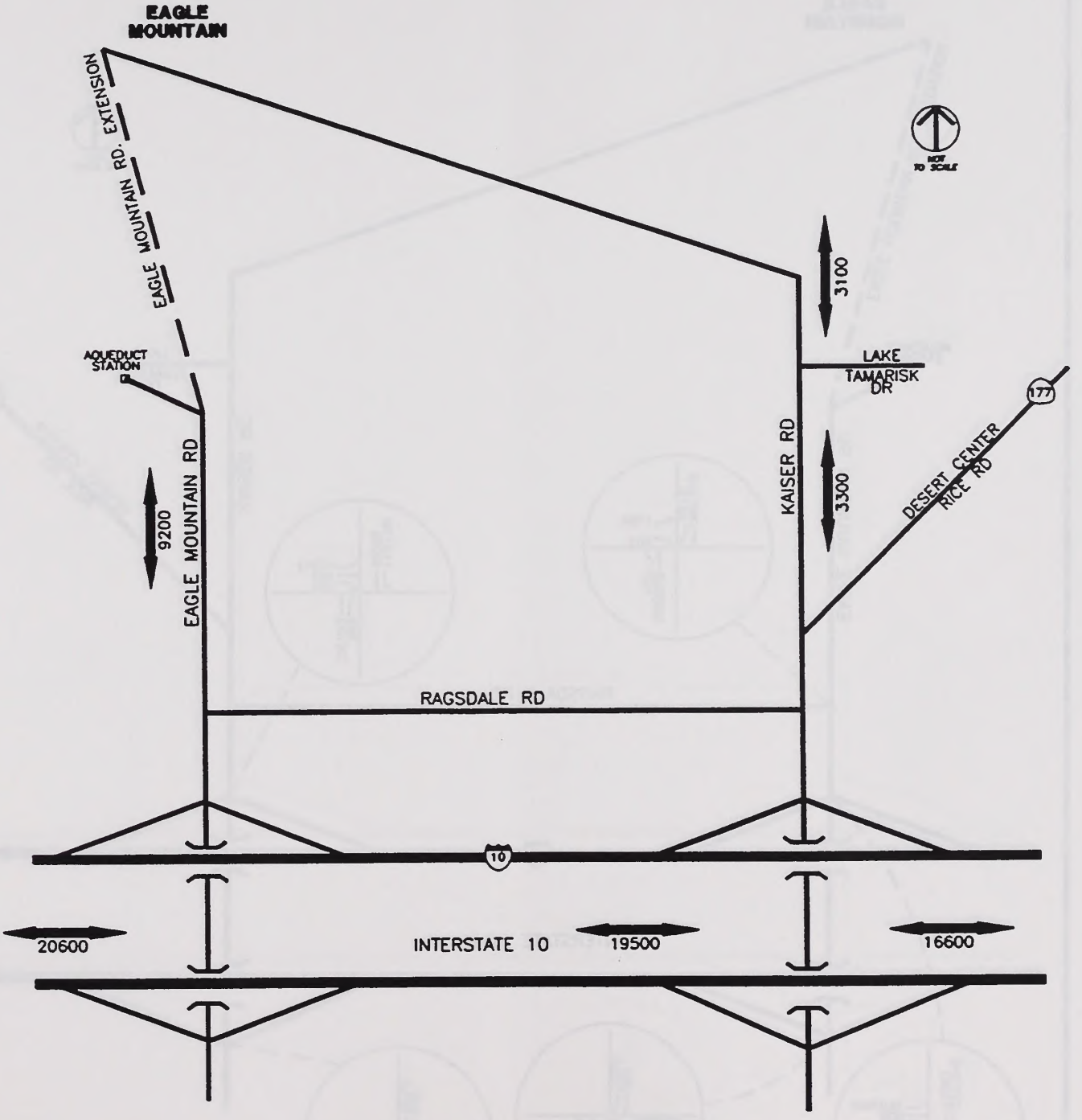


Figure 17
Forecast 2000 Average Daily Traffic (With Project)

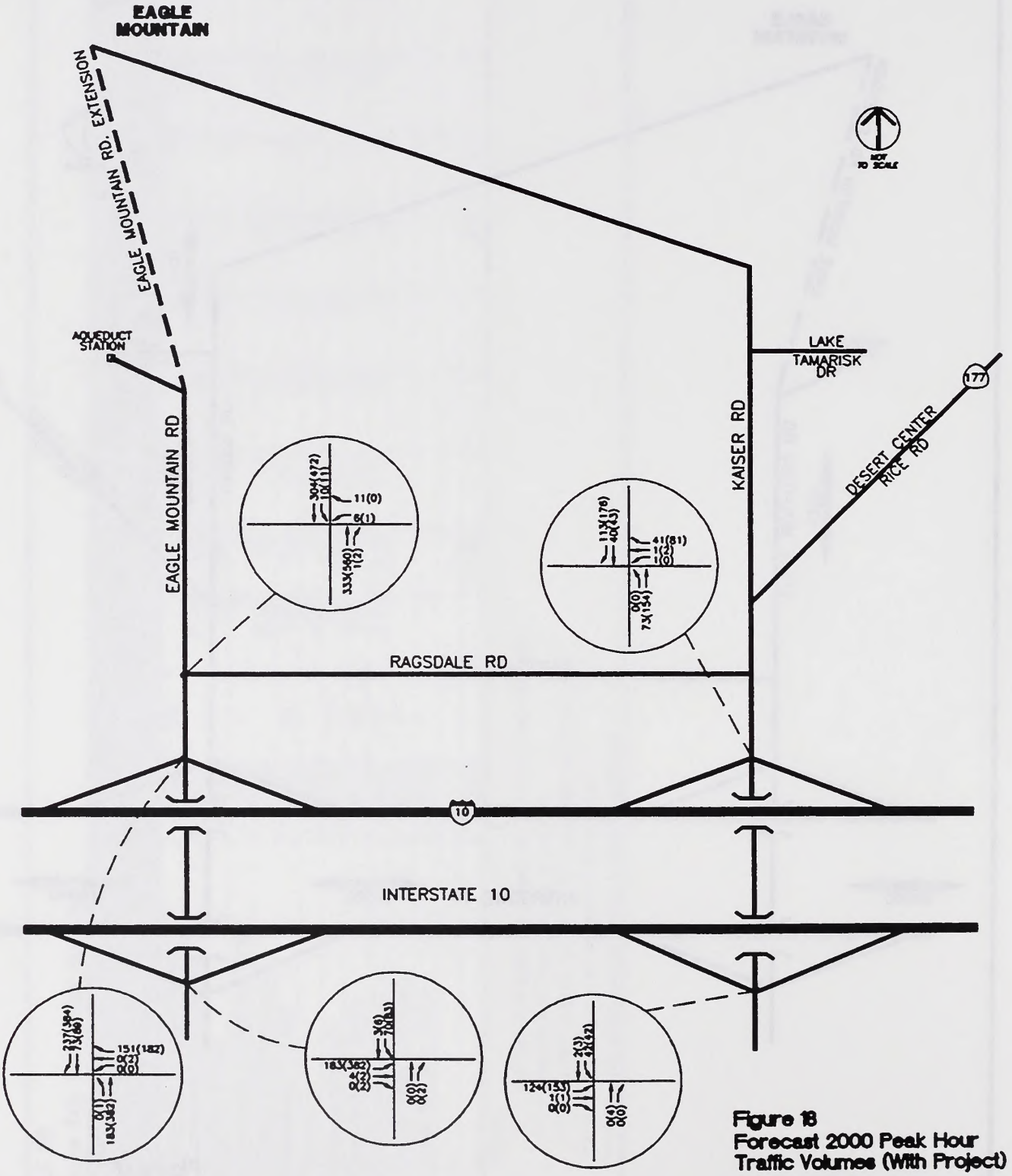


Figure 18
Forecast 2000 Peak Hour Traffic Volumes (With Project)

Legend:
XX(XX) = AM(PM)

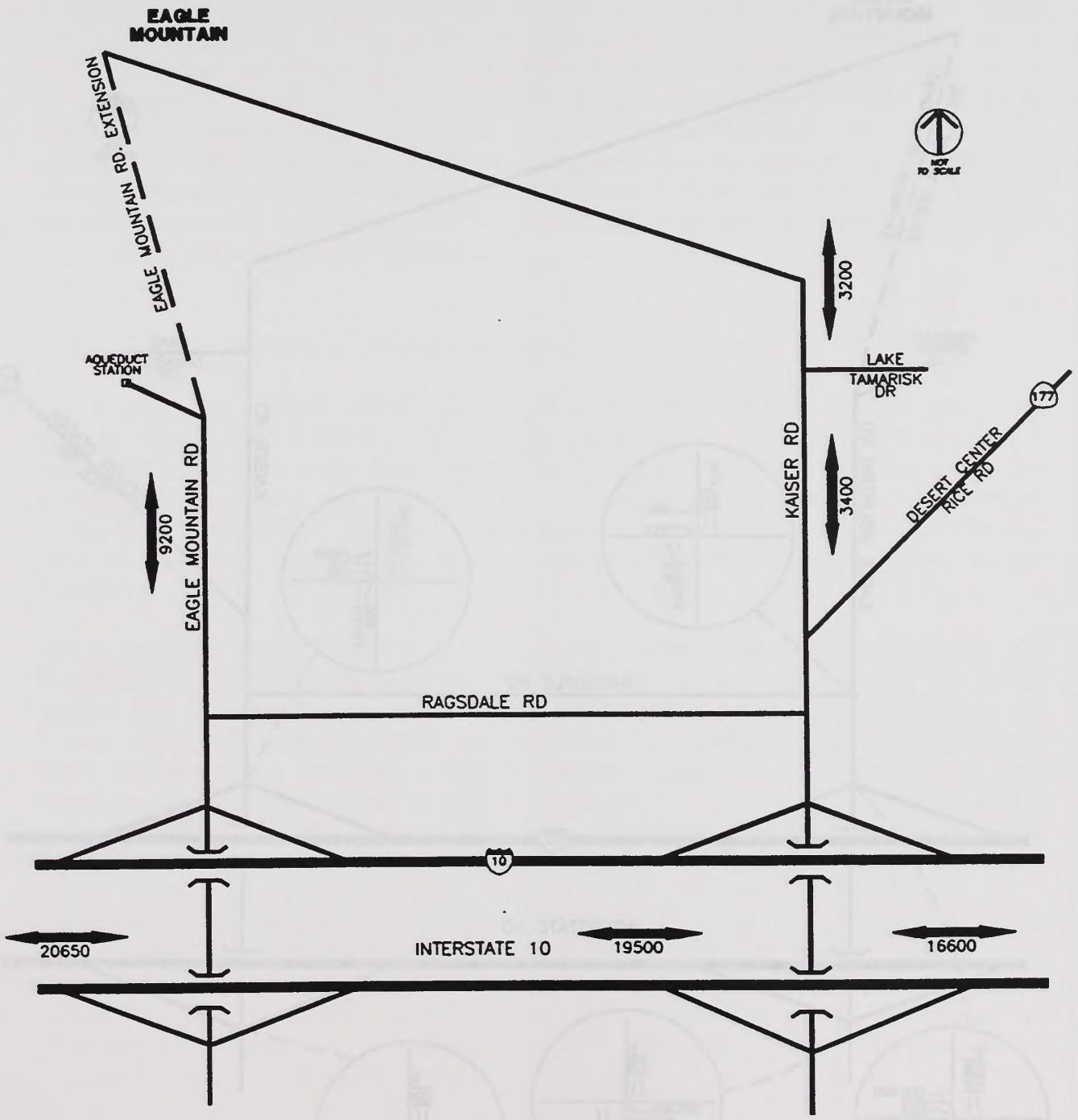


Figure 19
Forecast 2005 Average Daily Traffic (With Project)

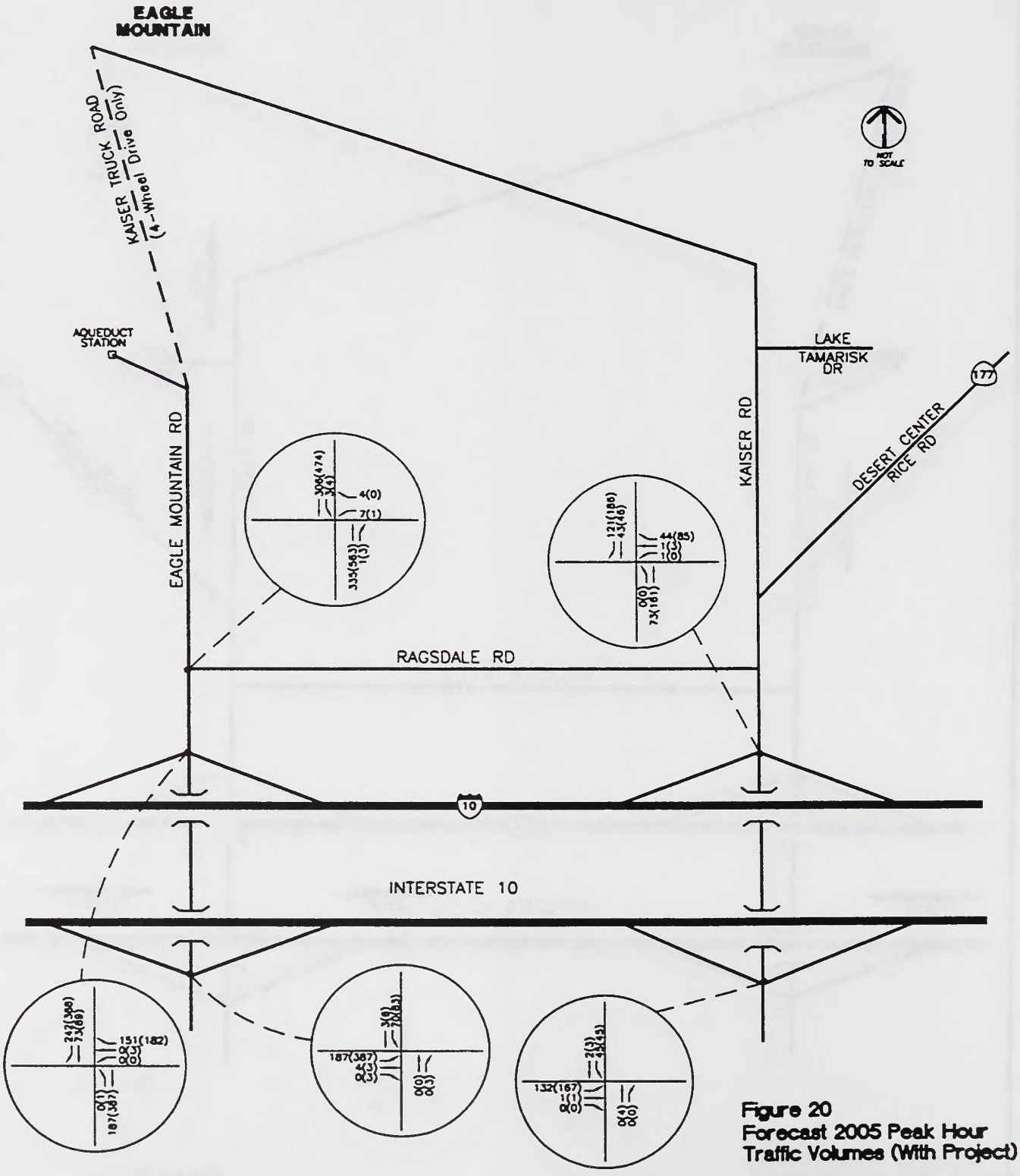


Figure 20
Forecast 2005 Peak Hour Traffic Volumes (With Project)

Legend:
XX(XX) = AM(PM)

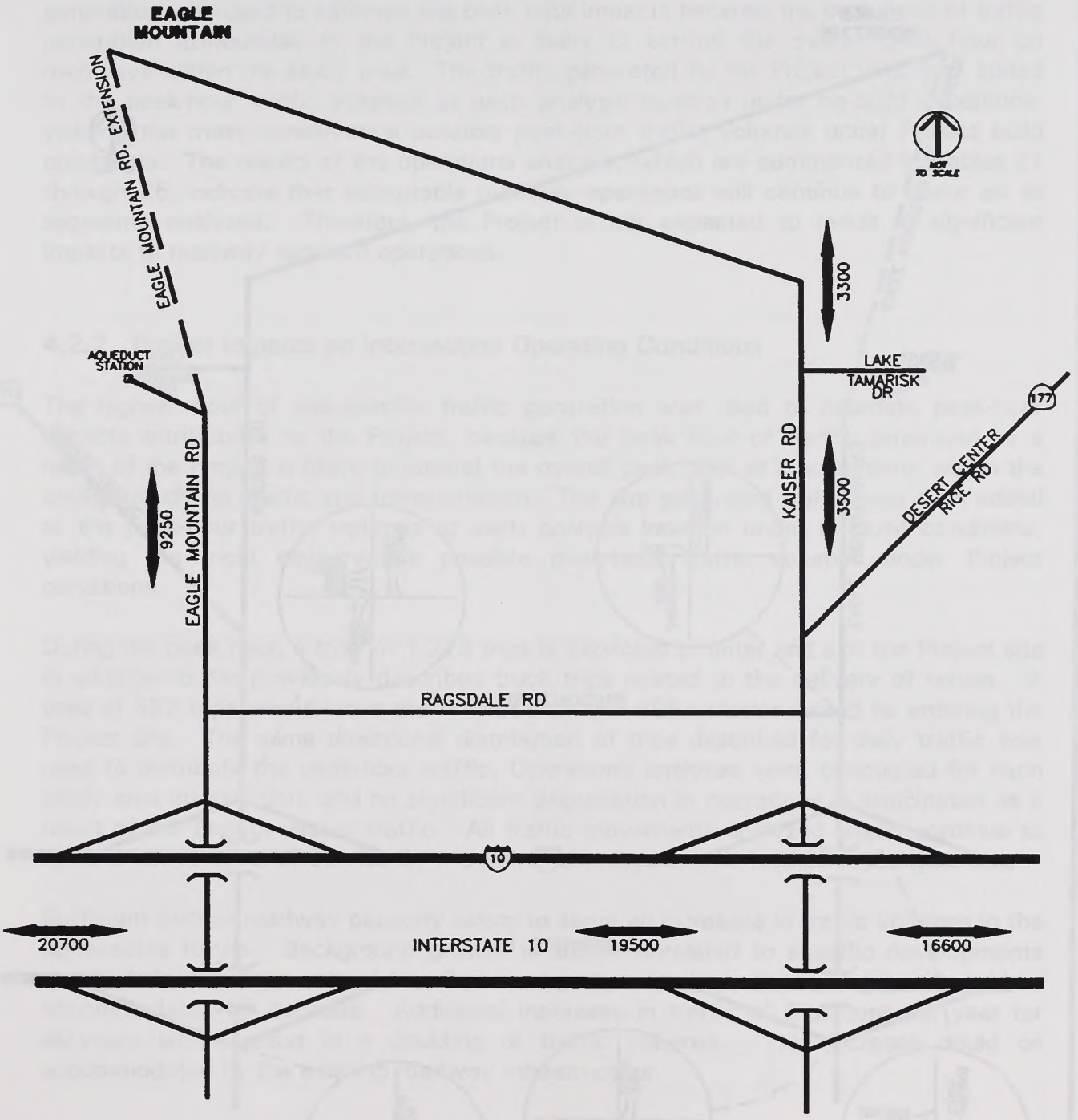


Figure 21
Forecast 2010 Average Daily Traffic (With Project)

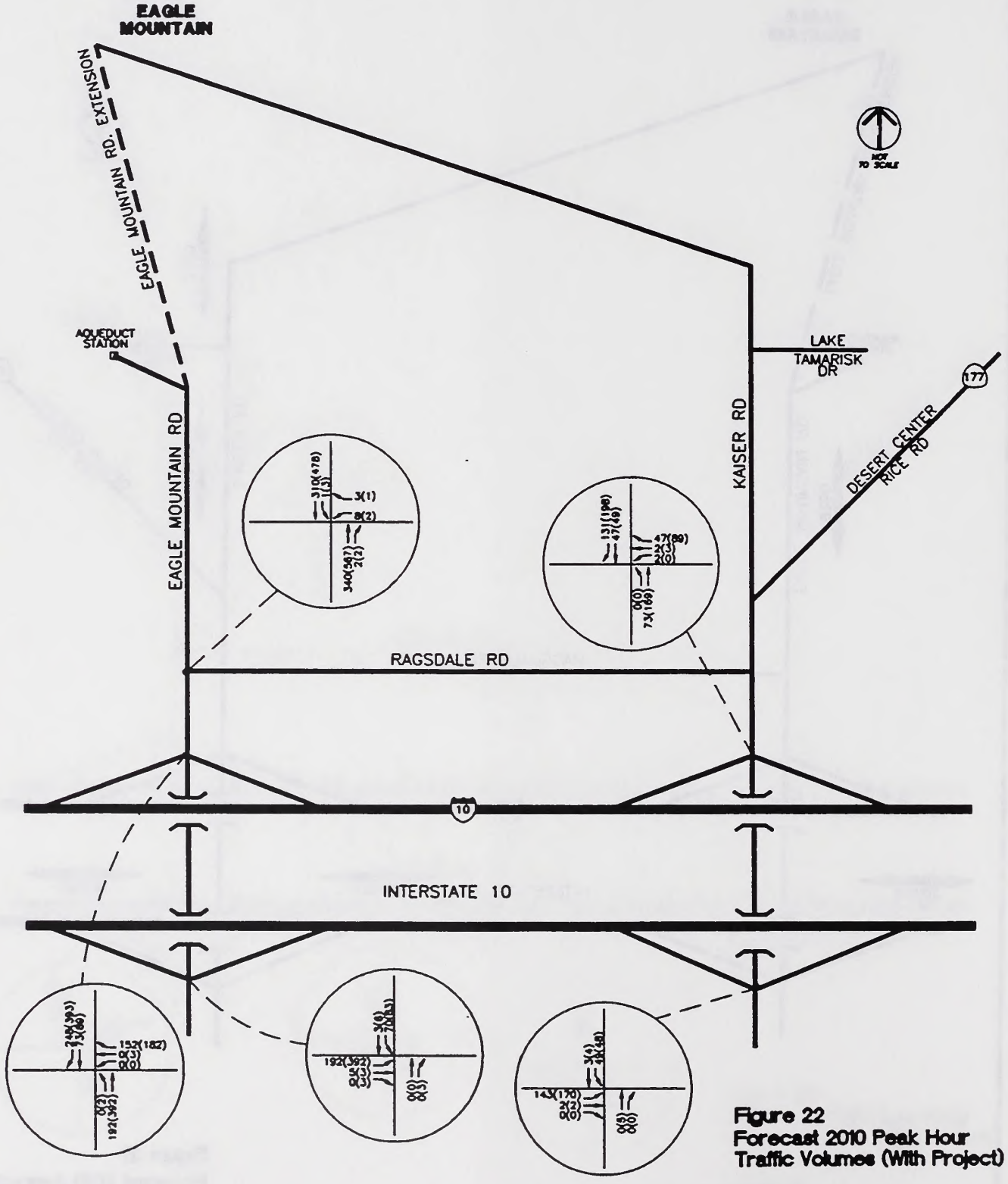


Figure 22
Forecast 2010 Peak Hour Traffic Volumes (With Project)

Legend:
XX(XX) = AM(PM)

4.2.1 Project Impacts on Roadway Segment Operating Conditions

The roadway segment operations analysis has been repeated for future conditions (i.e., years 2000, 2005 and 2010) with the Project. The highest hour of site-specific traffic generation was used to estimate the peak hour impacts because the peak hour of traffic generation attributable to the Project is likely to control the overall peak hour on roadways within the study area. The traffic generated by the Project was then added to the peak-hour traffic volumes at each analysis location under no-build conditions, yielding the most conservative possible peak-hour traffic volumes under Project build conditions. The results of the operations analysis, which are summarized in Tables 21 through 26, indicate that acceptable roadway operations will continue to occur on all segments analyzed. Therefore, the Project is not expected to result in significant impacts to roadway segment operations.

4.2.2 Project Impacts on Intersection Operating Conditions

The highest hour of site-specific traffic generation was used to estimate peak-hour impacts attributable to the Project, because the peak hour of traffic generated as a result of the Project is likely to control the overall peak hour at intersections within the area of study for traffic and transportation. The site generated traffic was then added to the peak-hour traffic volumes at each analysis location under no-build conditions, yielding the most conservative possible peak-hour traffic volumes under Project conditions.

During the peak hour, a total of 1,278 trips is expected to enter and exit the Project site in addition to the previously described truck trips related to the delivery of refuse. A total of 582 trips would leave the Project site, and 696 vehicles would be entering the Project site. The same directional distribution of trips described for daily traffic was used to distribute the peak-hour traffic. Operations analyses were conducted for each study area intersection, and no significant degradation in operations is anticipated as a result of the Project-related traffic. All traffic movements analyzed would continue to operate above Level of Service C, with minimal delays and no lack of capacity.

Sufficient excess roadway capacity exists to serve all increases in traffic volumes in the foreseeable future. Background growth in traffic unrelated to specific developments would likely occur at a rate of 1 to 2 percent per year or less, and such growth could be accommodated for decades. Additional increases in traffic of 2 percent per year for 40 years would result in a doubling of traffic volumes. This increase could be accommodated by the existing roadway infrastructure.

TABLE 21
Year 2000 Roadway Level-of-Service Summary

Roadway Segment Level-of-Service Summary	Year 2000 Base	Year 2000 + Project
Eagle Mountain Road n/o Ragsdale Road	A	C
Kaiser Road n/o Desert Center/Rice Road	A	B
Kaiser Road n/o Lake Tamarisk Drive	A	B
n/o: north of		

TABLE 22
Year 2005 Roadway Level-of-Service Summary

Roadway Segment Level-of-Service Summary	Year 2005 Base	Year 2005 + Project
Eagle Mountain Road n/o Ragsdale Road	A	C
Kaiser Road n/o Desert Center/Rice Road	A	B
Kaiser Road n/o Lake Tamarisk Drive	A	B
n/o: north of		

TABLE 23
Year 2010 Roadway Level-of-Service Summary

Roadway Segment Level-of-Service Summary	Year 2010 Base	Year 2010 + Project
Eagle Mountain Road n/o Ragsdale Road	A	C
Kaiser Road n/o Desert Center/Rice Road	A	B
Kaiser Road n/o Lake Tamarisk Drive	A	B
n/o: north of		

TABLE 24
Year 2000 Intersection Level-of-Service Summary

Int #	Intersection	AM Peak				PM Peak			
		Year 2000 Base Volumes		Year 2000 Base + Proj Volumes		Year 2000 Base Volumes		Year 2000 Base + Proj Volumes	
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
1	Eagle Mountain Road/ Interstate 10 EB Ramps	3.3	A	4.3	A	2.6	A	6.9	A
2	Eagle Mountain Road/ Interstate 10 WB Ramps	0.3	A	0.9	A	1.1	A	1.0	A
3	Eagle Mountain Road/ Ragsdale Road	2.6	A	0.1	A	0.7	A	0.0	A
4	Desert Center/Rice Rd/ Interstate 10 EB Ramps	3.3	A	3.8	A	3.2	A	4.0	A
5	Desert Center/Rice Rd/ Interstate 10 WB Ramps	0.6	A	0.5	A	0.5	A	0.6	B

EB: Eastbound
WB: Westbound
sec: seconds
LOS: level-of-service

TABLE 25
Year 2005 Intersection Level-of-Service Summary

Int #	Intersection	AM Peak				PM Peak			
		Year 2005 Base Volumes		Year 2005 Base + Proj Volumes		Year 2005 Base Volumes		Year 2005 Base + Proj Volumes	
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
1	Eagle Mountain Road/ Interstate 10 EB Ramps	3.3	A	4.3	A	2.6	A	4.0	A
2	Eagle Mountain Road/ Interstate 10 WB Ramps	0.3	A	0.9	A	1.0	A	1.0	A
3	Eagle Mountain Road/ Ragsdale Road	2.7	A	0.1	A	3.2	A	4.0	A
4	Desert Center/Rice Rd/ Interstate 10 EB Ramps	3.3	A	3.8	A	3.2	A	4.0	A
5	Desert Center/Rice Rd/ Interstate 10 WB Ramps	0.6	A	0.5	A	0.5	A	0.6	A

EB: Eastbound
WB: Westbound
sec: seconds
LOS: level-of-service

TABLE 26
Year 2010 Intersection Level-of-Service Summary

Int #	Intersection	AM Peak				PM Peak			
		Year 2010 Base Volumes		Year 2010 Base + Proj Volumes		Year 2010 Base Volumes		Year 2010 Base + Proj Volumes	
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
1	Eagle Mountain Road/ Interstate 10 EB Ramps	3.3	A	4.4	A	2.7	A	7.1	A
2	Eagle Mountain Road/ Interstate 10 WB Ramps	0.4	A	0.9	A	1.0	A	1.0	A
3	Eagle Mountain Road/ Ragsdale Road	2.4	A	0.1	A	1.1	A	0.0	A
4	Desert Center/Rice Road/ Interstate 10 EB Ramps	3.4	A	3.9	A	3.2	A	4.1	A
5	Desert Center/Rice Road/ Interstate 10 WB Ramps	0.6	A	0.5	A	0.5	A	0.6	B

EB: Eastbound
WB: Westbound
sec: seconds
LOS: level-of-service

Specific developments generating additional traffic would be required to study the impacts of their own traffic and mitigate any deficiencies identified.

4.2.3 Summary of Highway Related Impacts

At full operation, the Project is expected to generate a total of approximately 11,990 new trips either to or from the proposed landfill and the Townsite on a daily basis. This total number of trips includes 200 new truck trips each day, with 100 inbound trucks delivering refuse and 100 outbound trucks carrying away empty containers, and nearly 11,790 other new trips.

During the peak hour of daily traffic to and from the Project site, an estimated total of just under 1,300 trips would be generated. This would include 10 refuse trucks both entering and exiting the site during the course of the hour, and 1,280 other trips comprised of arriving and departing employees, delivery and service traffic, and any other Townsite-related traffic. The majority of this traffic is expected to travel to and from the west.

Operations analyses at study area intersections indicate that excellent operating conditions will continue to exist in the study area. All study area traffic movements will continue to experience acceptable LOS.

5. Project Alternatives

5. PROJECT ALTERNATIVES

Six alternatives to the project have been identified and analyzed in this study. This section briefly identifies the six alternatives and provides qualitative analysis and comparisons to the proposed project.

5.1 No Action Alternative

The No Action Alternative would leave the Eagle Mountain iron-ore site in its present condition, and no landfill would be developed. The limited mining-related activities would continue, at least temporarily. The existing mining reclamation plan (Kaiser Steel Corporation, 1978) would be implemented. The East Pit and surrounding piles of overburden rock and mine tailing would remain, with minor drainage improvements to stabilize their surfaces and allow revegetation to occur. Metropolitan Southern California communities would continue to rely on existing, expanded, or new landfills. The No Action Alternative would leave the Townsite in its present condition, and no further redevelopment beyond existing approved uses would occur.

IMPACTS

The No Action Alternative would preclude the occurrence of any potential impacts to services associated with the project.

MITIGATION

No mitigation measures are required for this alternative.

SIGNIFICANCE AFTER MITIGATION

The potential for impacts to transportation services would be reduced below the level of significance.

5.2 Reduced Volume of On-Site Disposal Alternative

This alternative to the proposed Project would reduce the quantity of material shipped by rail to up to 14,000 tons per day and would also reduce the quantity of material shipped by truck to as much as 2,000 tons per day.

The reduction in the quantity of material shipped by rail would result in an average of 4.1 trains per day delivering refuse to the site. The amount of daily delay would be reduced proportionately, whereas the per-train delays would remain unchanged.

Similarly, the calculated values of the hazard indexes would be reduced by 15 percent along the primary segment, because the hazard index is directly proportional to the daily

train volume. Similar but more limited effects of this alternative would occur along the secondary rail segments.

The reduction in truck traffic would affect only Interstate 10, Eagle Mountain Road, and the Eagle Mountain Road extension. Approximately 13 two-way truck trips would be eliminated and the overall number of trip ends generated by the Project would drop from 1,300 to 900 trip ends per day.

Level of Service C or better conditions would still prevail for all traffic movements analyzed in the study area.

IMPACTS

The potential impacts under this alternative would be essentially identical to those of the proposed action. A reduction of waste disposed in the landfill would reduce daily traffic of the project slightly. Such a reduction would be unlikely to result in a major decrease in the number of employees needed to operate the landfill. This alternative would not alter the conclusions regarding impacts and mitigation measures associated with the proposed action.

MITIGATION

Mitigation measures would be the same as those associated with the proposed action.

SIGNIFICANCE AFTER MITIGATION

The mitigation measures incorporated into a reduced scale project design would reduce potential impacts to transportation services to below the level of significance.

5.3 Alternate Road Access Alternative

Under this alternative, transfer trucks would use the existing Kaiser Road to bring waste to the site instead of the existing Eagle Mountain Road and its proposed extension. The existing Kaiser Road is located approximately 3 miles east of Eagle Mountain Road and extends approximately 11 miles to the landfill site from Interstate 10. Use of Kaiser Road instead of Eagle Mountain Road is not as direct a route to the landfill and thus would result in approximately an additional 7.5 miles round trip for each truck and service vehicle, resulting in an increase in vehicle miles traveled. The additional trucks on Kaiser Road would also increase potential hazards related to existing vehicle use on Kaiser Road, especially that of school buses that transport elementary and high school students to the Eagle Mountain School and to Palo Verde High School. All other aspects of the proposed Project would remain the same.

IMPACTS

The potential impacts under this alternative would be identical with those of the proposed Project with the exception of an increase in landfill vehicle miles traveled that would affect overall mobility and the safety hazards associated with school buses. This alternative would not alter the conclusions regarding impacts and mitigation measures for transportation associated with the proposed Project.

MITIGATION

Because of the potential for safety hazards resulting from the presence of school buses and refuse truck traffic, the following mitigation measures are recommended: (1) provide school bus turnouts for pick ups and drop offs; (2) provide strategically placed striped pedestrian crosswalks; and (3) provide warning signs (with flashing yellow lights, if possible) to alert motorists to these school bus turnouts. No other mitigation measures are required for this alternative.

SIGNIFICANCE AFTER MITIGATION

The impacts of this alternative are not considered significant.

5.4 Rail Access Only Alternative

This alternative would eliminate the transport of refuse to the landfill via truck. All deliveries to the site would be made by rail, and the overall quantity of waste handled at the site on a daily basis would be reduced by 10 percent (from 20,000 tons per day to 18,000 tons per day).

This alternative would primarily affect the impacts of the Project on the highway network. There would be change in the average number of daily unit trains delivering refuse to the site and service would be provided along the same routes described in the Project Description (see Chapter 2).

The proposed elimination of trucks for transporting waste to the site would not change the amount of highway traffic that uses at-grade crossings along the rail routes, nor would it affect the average number of trains using these crossings. The amount of delay caused by the Project at these crossings is unchanged from the delays caused by the proposed Project in the absence of the delays. As previously described, average delays of 1 to 2 minutes per vehicle would be incurred at each grade crossing by the passage of a refuse train.

Similarly, this alternative would result in the same hazard rankings for each of the at-grade crossings studied. The impact compared to the proposed Project is negligible in terms of increasing the ranking of crossings along the primary analysis segment between Colton and Eagle Mountain. The changes caused by increases in highway

volumes at these crossings resulting from regional growth are greater than the changes that would be attributed solely to the Project.

IMPACTS

This alternative would significantly reduce the overall volume of traffic to the Project site and would also decrease the percent of truck traffic generated by the landfill. Eliminating the 400 two-way truck trips delivering refuse to the site reduces the overall number of trip ends generated by the landfill from 1,300 trip ends to 500 trip ends daily. Truck trips to the site would be made on an incidental basis only, for purposes such as supply deliveries. The benefit of this reduction in truck traffic would be evident along the Kaiser Truck Road and on Eagle Mountain Road between the Kaiser Road and the Interstate 10 interchange, the proposed route for delivery of waste to the site.

Traffic volumes on Kaiser Road and Desert Center/Rice Road would remain unchanged from the conditions described for the Project. Intersection operations at the locations analyzed would continue to be excellent, because this alternative would not cause any further increase in traffic beyond that projected for the proposed Project.

MITIGATION

Create truck routes to the site and prohibit through truck traffic on Kaiser Truck Road. No additional mitigation measures would be required for this alternative.

SIGNIFICANCE AFTER MITIGATION

The potential for impacts would be reduced to below the level of significance.

5.5 Landfill on Kaiser Land Only Alternative

This alternative would allow for operation of the landfill in the absence of implementing the proposed land exchange between the BLM and Kaiser. The proposed rights-of-way would still be implemented. The landfill would comprise only Kaiser-owned lands in and around the East Pit for landfill development. The landfill would accept a maximum of 16,000 tons per day of municipal solid waste. Landfill design, construction, operation, environmental monitoring and closure and postclosure would be as described for the proposed project.

Under this alternative, the way in which waste would be transported to the landfill for disposal is identical to the proposed Project. A maximum of four trains per day, 6 days per week will be processed at peak operation. Waste will also be hauled by no more than 100 transfer trucks per day. Vehicle access to the Project site will also be achieved as previously described. Waste containers arriving at the landfill will be handled as described above.

IMPACTS

The amount of traffic for landfill construction and operations would be slightly reduced under this alternative. The expected life of the landfill would be reduced to about 23 years. The number of landfill employees would also be slightly reduced from the level of the proposed Project.

MITIGATION

Mitigation measures would be the same as those associated with the proposed Project.

SIGNIFICANCE AFTER MITIGATION

The mitigation measures incorporated into the proposed Project design would reduce potential impacts to transportation services to below the level of significance.

5.6 Landfill Development/No Townsite Development Alternative

Under this alternative, the landfill would proceed as described under the proposed Project but the Townsite Specific Plan would not be approved and improvements would not occur within the existing Townsite. It is assumed under this option that employees working at the landfill would commute to the site from Desert Center, Blythe, and other communities.

IMPACTS

Under this option, it is assumed that the landfill would be developed, but that no improvements would be made to the Townsite. Employees working at the landfill would not live in the Townsite and would most likely reside in and commute from other communities, thus increasing potential vehicle miles traveled and external trips due to the landfill. The most likely communities to absorb the additional employment would be Desert Center, Blythe, Indio, and eastern Coachella Valley communities. This increase would be offset by the decrease in trip generation resulting from landfill employees commuting to the site from other communities.

MITIGATION

No mitigation measures are required or warranted.

SIGNIFICANCE AFTER MITIGATION

Because traffic demands are reduced and will not substantially affect service capacity, potential impacts are below the level of significance.

APPENDIX A
At-Grade Crossing Existing Conditions

1996 DATA

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
EAGLE MOUNTAIN TO FERRUM - Segment 1A										
NO CROSSINGS										
FERRUM TO COLTON YARD - Segment 1B										
Parkside Dr.	8	340	15	42	0.20	2,856		4.29	10	1.5
Bay Dr.	9	692	15	42	0.11	3,197		8.70	6	3.2
Cleveland St.	9	75	35	42	0.11	347		0.18		0.2
Hammond Rd.	9	403	35	42	0.11	1,862		0.94		0.9
66th Av.	9	3,938	35	42	0.11	18,194	5	8.74	5	9.5
62nd Av.	9	616	35	42	0.11	2,846		1.43		1.4
58th Av.	8	793	35	42	0.20	6,661		1.84		1.8
Airport Blvd.	9	5,775	35	42	0.11	26,681	3	12.49	3	14.7
Av. 54	GS	0	35	42	0.00	0		0.00		0.0
52nd Av.	9	1,246	35	42	0.11	5,757		2.87		2.8
5th St.	8	258	35	42	0.20	2,167		0.60		0.6
50th Av.	8	1,431	35	42	0.20	12,020	9	3.29		3.2
Dillon Rd.	9	7,297	35	42	0.11	33,712	1	15.44	1	19.5
South Indio Oh	GS	0	35	42	0.00	0		0.00		0.0
Jackson St. SR 10	GS	20,983	35	42	0.00	0		0.00		101.3
Monroe St. Oh	GS	0	35	42	0.00	0		0.00		0.0
Monroe St.	GS	9,338	35	42	0.00	0		0.00		26.8
Indio Oh St. 10	GS	0	35	42	0.00	0		0.00		0.0
Washington St. DVHD	GS	3,561	35	42	0.00	0		0.00		8.5
Monterey Av.	GS	0	35	42	0.00	0		0.00		0.0
Ramon Rd. Oh	GS	6,681	35	42	0.00	0		0.00		17.5
Date Palm Dr. Oh	GS	4,441	35	42	0.00	0		0.00		10.9
Palm Dr. Oh	GS	5,624	35	42	0.00	0		0.00		14.3
Indian Av. Oh	GS	5,788	35	42	0.00	0		0.00		14.8
Tipton Rd.	9	113	35	42	0.11	522		0.26		0.2
Palm Spr OVH St. 111	GS	0	35	42	0.00	0		0.00		0.0
Broadway	9	1,875	35	42	0.11	8,663	10	4.28		4.3
Apache Trail	9	3,800	35	42	0.11	17,556	6	8.45	7	9.1
Hargreave St.	9	3,787	35	42	0.11	17,496	7	8.42	8	9.1
San Gorgonio Av.	9A	3,712	35	42	0.11	17,149	8	8.26	9	8.9
Eight St.	GS	0	35	42	0.00	0		0.00		0.0
22nd St.	9	7,132	35	42	0.11	32,950	2	15.12	2	19.0
North Sunset Av.	9A	667	35	42	0.11	3,082		1.55		1.5
Highland Springs Av.	9	289	35	42	0.11	1,335		0.67		0.6
Pennsylvania Av.	9	629	35	42	0.11	2,906		1.46		1.4
Beaumont Av. St. 79	9	4,278	35	42	0.11	19,764	4	9.45	4	10.4
California Av.	9	1,447	35	42	0.11	6,685		3.32		3.3
Veile Av.	8	503	35	42	0.20	4,225		1.17		1.1
Beaumont Oh St. 60	GS	5,630	35	42	0.00	0		0.00		14.3
San Timoteo Cyn Rd.	9	453	35	42	0.11	2,093		1.05		1.0
Live Oak Cyn Rd.	9	969	35	42	0.11	4,477		2.24		2.1
Allesandro Rd.	9	828	35	42	0.11	3,825		1.92		1.8
San Timateo Cyn Rd.	9	0	35	42	0.11	0		0.00		0.0
Beaumont Av.	9	323	35	42	0.11	1,492		0.75		0.7
Whittier Av.	9	189	35	42	0.11	873		0.44		0.4
Barton Rd. Oh	GS	0	35	42	0.00	0		0.00		0.0
Mountain View Av.	GS	0	35	42	0.00	0		0.00		0.0
Anderson St. Oh	GS	0	15	42	0.00	0		0.00		0.0
Waterman Av.	GS	0	15	42	0.00	0		0.00		0.0
Hunts Ln.	GS	0	15	42	0.00	0		0.00		0.0
Colton Loma Linda Yd	GS	0	15	42	0.00	0		0.00		0.0
Colton St. 15	GS	0	15	42	0.00	0		0.00		0.0
So. East Conn. Oh	GS	0	15	42	0.00	0		0.00		0.0

1996 DATA

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Mount Vernon Av.	GS	0	15	42	0.00	0		0.00		0.0
TOTALS:						**261,392**		**129.61**		**342.37**
COLTON YARD TO INDUSTRY TRANSFER YARD - Segment 2										
Colton Yard	GS	0	15	43	0.00	0		0.00		0.0
La Cadena Dr. Up	GS	0	15	43	0.00	0		0.00		0.0
Rancho Av. Oh	GS	0	15	43	0.00	0		0.00		0.0
Pepper Av. Oh	GS	1,739	15	43	0.00	0		0.00		8.2
Riverside Av. Oh	GS	12,404	40	43	0.00	0		0.00		35.8
Cedar Av. Oh	GS	17,969	40	43	0.00	0		0.00		66.2
Sierra Av. Oh	GS	20,287	40	43	0.00	0		0.00		84.5
Citrus Av. Oh	GS	7,303	40	43	0.00	0		0.00		17.6
Cherry Av. Oh	GS	4,405	40	43	0.00	0		0.00		9.7
Etiwanda Av.	GS	11,245	40	43	0.00	0		0.00		31.0
Vina Vista Oh	GS	0	40	43	0.00	0		0.00		0.0
Milliken Av.	9	12,056	40	43	0.11	57,025	2	18.19	3	34.3
Haven Av.	GS	0	40	43	0.00	0		0.00		0.0
Turner Av.	9	927	40	43	0.11	4,385		1.64		1.8
Archibald Av.	9	3,942	40	43	0.11	18,646		6.70		8.5
Vineyard Av.	9	10,433	40	43	0.11	49,348	4	16.14	5	27.9
Grove Av. Up	GS	0	40	43	0.00	0		0.00		0.0
Bon View Av.	9	8,231	40	43	0.11	38,933	6	13.16	7	20.4
Campus Av.	9	6,144	40	43	0.11	29,061		10.13		14.2
Sultana Av.	9	4,057	40	43	0.11	19,190		6.89		8.8
Euclid Av. Up	GS	0	40	43	0.00	0		0.00		0.0
Euclid Av. State 83	9	25,504	40	43	0.11	120,634	1	30.39	2	150.6
Vine Av.	9	5,333	40	43	0.11	25,225		8.89		12.0
San Antonio Av.	9	4,985	40	43	0.11	23,579		8.36		11.1
Mountain Av. Oh	GS	0	40	43	0.00	0		0.00		0.0
Central Av. Oh	GS	0	40	43	0.00	0		0.00		0.0
Monte Vista Av.	9	6,028	40	43	0.11	28,512		9.95		13.9
Co Rd. Ramona Av.	9	8,598	40	43	0.11	40,669	5	13.68	6	21.6
East End Av.	9	7,377	40	43	0.11	34,893	7	11.95	8	17.8
Reservoir Av.	9	6,835	40	43	0.11	32,330	9	11.16	10	16.2
San Antonio Av.	9	7,216	40	43	0.11	34,132	8	11.71	9	17.3
Towne Av.	GS	0	40	43	0.00	0		0.00		0.0
Palamores St.	9	6,040	40	43	0.11	28,569		9.97		13.9
Garey Av.	GS	0	40	43	0.00	0		0.00		0.0
Main St.	9	3,384	40	43	0.11	16,006		5.80		7.2
Park Av.	9	6,633	40	43	0.11	31,374	10	10.86		15.6
White Av.	GS	0	40	43	0.00	0		0.00		0.0
Hamilton Bl.	9	10,679	40	43	0.11	50,512	3	16.46	4	28.8
State St. 71	GS	0	40	43	0.00	0		0.00		0.0
Humane Way	GS	0	40	43	0.00	0		0.00		0.0
Omar Oh	GS	0	40	43	0.00	0		0.00		0.0
Temple Av.	9	53	40	43	0.11	251		0.09		0.1
Pomona Bl.	9	3,868	40	43	0.11	18,296		6.58		8.4
Brea Canyon Rd.	9	4,211	40	43	0.11	19,918		7.13		9.2
Lemon Rd.	9	2,212	40	43	0.11	10,463		3.85		4.6
Fairway Dr.	9	0	40	43	0.11	0		0.00		0.0
Nogales Av.	9	2,480	15	43	0.11	11,730		30.43	1	12.0
Fullerton Rd.	GS	0	15	43	0.00	0		0.00		0.0
Azusa Av. Oh	GS	3,184	15	43	0.00	0		0.00		15.7
TOTALS:						**743,679**		**270.16**		744.9
INUSTRY TRANSFER STATION TO BASSETT JUNCTION - SEGMENT 3										
Brea Canyon	9	9804	60	28	0.11	30,197	4	6.84	4	18.9

1996 DATA

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Lemon	9	7761	60	28	0.11	23,904	5	5.58	5	13.9
Fairway	9	324	60	28	0.11	999	9	0.26	9	0.5
Nogales	9	30446	60	28	0.11	93,773	1	14.61	1	218.8
California	9	5889	60	28	0.11	18,137	7	4.35	7	10.0
Sunset	9	17215	60	28	0.11	53,022	2	10.66	2	45.0
Orange	9	3906	60	28	0.11	12,030	8	2.97	8	6.2
Puente	9	16220	60	28	0.11	49,959	3	10.22	3	40.4
Vineland	9	6466	60	28	0.11	19,914	6	4.74	6	11.1
TOTALS:						**301,936**		**60.21**		364.7
BASSETT JUNCTION TO SOUTHERN PACIFIC LA TRANSPORTATION CENTER - SEGMENT 4										
Temple	9	19190	60	28	0.11	59,107	7	11.49		55.4
Cogswell	9	6015	50	28	0.11	18,528		6.37		11.7
Peck	9	33160	40	28	0.11	102,134	2	33.53	4	505.6
Ramona	9	33300	30	28	0.11	102,564	1	59.53	2	661.0
Cypress	9	3975	30	28	0.11	12,242		11.99		10.9
Tyler	9	13932	30	28	0.11	42,912		36.20	3	54.0
Arden	9	13105	35	28	0.11	40,364		25.38	7	43.2
Baldwin	9	25017	40	28	0.11	77,052	4	30.10	5	142.2
Temple City	9	21484	45	28	0.11	66,170	5	21.86	9	87.5
Lower Azusa	9	11816	50	28	0.11	36,394		11.48		28.0
Encinita	9	5586	50	28	0.11	17,204		5.95		10.7
Walnut Grove	9	4839	50	28	0.11	14,905		5.21		9.1
San Gabriel	9	32833	50	28	0.11	101,125	3	21.45	10	394.5
Del Mar	9	14259	50	28	0.11	43,917	10	13.33		37.3
Mission	9	15592	50	28	0.11	48,023	9	14.26		43.2
Ramona	9	17024	50	28	0.11	52,433	8	15.20		50.4
Valley	9	20955	25	28	0.11	64,543	6	69.47	1	133.9
Boca	NA	6230	25	28	0.00	0		26.18	6	21.4
Vineburn	NA	2168	20	28	0.00	0		15.04		8.0
San Pablo	NA	3223	20	28	0.00	0		22.04	8	12.3
TOTALS:						**899,616**		**456.07**		2320.1
SP LA TRANSPORTATION CENTER TO NORTHERN ORANGE CO - SEGMENT 5										
Washington Blvd	NA	25942	10	20	0.00	0		487.19	2	536.4
Santa Fe Ave	NA	16435	10	20	0.00	0		367.27	3	190.0
25th St	NA	4834	10	20	0.00	0		129.06		36.3
E. Alameda st	NA	8594	10	20	0.00	0		217.32	6	72.9
41st Street	4	10656	10	24	0.34	86,953	4	261.23	5	97.2
Vernon Ave	4	12998	10	4	0.34	17,677		307.22	4	129.6
51st Street	4	215	10	2	0.34	146		6.11		1.4
55th Street	8	6649	10	28	0.20	37,236		173.00	8	52.9
Slauson Ave	8	30400	10	28	0.20	170,238	1	520.07	1	997.2
Randolph St	8	7240	20	28	0.20	40,544	10	46.79		31.1
Gage Ave	9	18369	20	28	0.11	56,576	7	99.51		123.8
Florence Ave	9	28262	20	20	0.11	62,177	6	126.82		384.0
Nadeau st	9	13427	20	20	0.11	29,540		78.97		72.3
Santa Fe Ave	9	9560	15	10	0.11	10,516		106.03		57.6
Long Beach Blvd	9	19658	15	30	0.11	64,871	5	184.88	7	183.6
State St	9	12890	20	10	0.11	14,179		76.47		67.9
California Ave	9	11816	20	10	0.11	12,998		71.29		59.7
San Juan Ave	9	3223	20	6	0.11	2,127		22.04		12.3
Otis Ave	9	12890	20	10	0.11	14,179		76.47		67.9
Atlantic Ave	9	26855	20	10	0.11	29,540		124.05		318.8
Garfield Ave	9	25888	20	4	0.11	11,391		121.94		282.8
Firestone Blvd	9	46298	20	6	0.11	30,557		129.26		-738.2
Rives Ave	9	8594	20	6	0.11	5,672		54.45		38.7

1996 DATA

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Paramount Bvlvd	9	26533	20	2	0.11	5,837		123.37		306.1
Downey Ave	9	10194	20	6	0.11	6,728		63.06		48.5
Dolan Ave	9	387	20	12	0.11	510		2.75		1.4
Brookshire Ave	9	9131	20	12	0.11	12,052		57.39		41.8
Patton Rd	9	8594	20	12	0.11	11,343		54.45		38.7
Lakewood Blvd	9	36523	20	30	0.11	120,525	2	135.52	9	3270.6
Woodruff Ave	9	15039	20	30	0.11	49,628	8	86.17		86.7
Stewart & Gray Rd	9	9023	20	10	0.11	9,926		56.81		41.2
Regent View Ave	9	2578	20	10	0.11	2,836		17.79		9.6
Hoxie Ave	8A	107	20	6	0.11	71		0.77		0.4
Studebaker Rd	8	13127	20	6	0.20	15,752		77.58		69.8
Orr & Day Rd	8	27	20	4	0.20	21		0.19		0.1
Pioneer Blvd	9	16059	20	6	0.11	10,599		90.48		96.8
San Antonio Blvd	9	18906	20	6	0.11	12,478		101.46		131.0
Funston Ave	8	3545	20	6	0.20	4,254		24.14		13.6
Rosecrans Ave	9	30077	20	6	0.11	19,851		129.83		502.3
Bloomfield Ave	9	7519	20	6	0.11	4,963		48.40		32.6
Shoemaker Ave	9	489	20	4	0.11	215		3.47		1.7
Carmenita Rd	8	3223	20	6	0.20	3,867		22.04		12.3
Alondra Blvd	9	4297	20	10	0.11	4,726		28.96		16.9
Marquardt Ave	9A	322	20	4	0.11	142		2.29		1.1
Valley View Ave	9	2148	20	10	0.11	2,363		14.91		7.9
Artesia Blvd	9	26855	20	12	0.11	35,448		124.05		318.8
Knott Ave	9	21484	20	12	0.11	28,359		110.09		172.1
Western Ave	9A	16113	20	12	0.11	21,269		90.70		97.4
Beach Blvd	9	36523	20	30	0.11	120,525	3	135.52	10	3270.6
Stanton Ave	9	12461	20	30	0.11	41,120	9	74.42		64.5
TOTALS:						**1,242,527**		**5464.07**		11730.6
COLTON YARD TO LA VERNE TRANSFER STATION - SEGMENT 6										
Meridian Ave	NA	645	50	2	0.00	0		0.74		1.1
Pepper Ave	8	10742	50	2	0.20	4,297	7	10.61	10	24.5
Eucalyptus Ave	3	2148	50	2	0.34	1,461		2.40		3.7
Acacia Ave	9	3223	60	2	0.11	709		2.47		5.0
Sycamore Ave	3	3760	60	2	0.34	2,557		2.86		6.0
Date Ave	3	215	60	2	0.34	146		0.17		0.3
Olive Ave	3	215	60	2	0.34	146		0.17		0.3
Riverside Ave	9	12890	60	2	0.11	2,836		8.57		27.9
Orange Ave	3	215	60	2	0.34	146		0.17		0.3
Palm Ave	3	537	60	2	0.34	365		0.43		0.8
Willow Ave	9	2148	60	2	0.11	473		1.67		3.3
Lilac Ave	9	1826	60	2	0.11	402		1.43		2.7
Cactus Ave	9	2685	60	2	0.11	591		2.07		4.1
Cedar Ave	9	2685	60	2	0.11	591		2.07		4.1
Linden Ave	3	752	60	2	0.34	511		0.60		1.1
Maple Ave	3	537	60	2	0.34	365		0.43		0.8
Locust Ave	3	2578	60	2	0.34	1,753		1.99		4.0
Laurel Ave	3	724	60	2	0.34	492		0.57		1.1
Alder Ave	9A	4404	60	2	0.11	969		3.32		7.1
Tamarind Ave	3	1826	60	2	0.34	1,242		1.43		2.7
Palmetto Ave	3	3115	60	2	0.34	2,118		2.39		4.8
Mango Ave	8	6445	60	2	0.20	2,578		4.72		11.1
Sierra Ave	8	13213	60	2	0.20	5,285	56	8.74		28.9
Juniper Ave	9	5586	50	2	0.11	1,229		5.95		10.7
Cypress Ave	3	2685	50	2	0.34	1,826		2.98		4.7
Oleander Ave	3	2685	50	2	0.34	1,826		2.98		4.7
Citrus Ave	9A	3223	50	2	0.11	709		3.55		5.8

1996 DATA

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Tokay Ave	NA	376	50	2	0.00	0		0.43		0.6
Almeria Ave	NA	161	50	2	0.00	0		0.18		0.3
Sultana Ave	NA	21	50	2	0.00	0		0.02		0.0
Hemlock Ave	NA	107	50	2	0.00	0		0.12		0.2
Miller Ave	NA	269	50	2	0.00	0		0.31		0.4
Redwood Ave	NA	269	50	2	0.00	0		0.31		0.4
Base Line St	NA	1074	50	2	0.00	0		1.22		1.8
East Ave	3	645	50	2	0.34	438		0.74		1.1
Etiwanda Ave	9	2685	50	2	0.11	591		2.98		4.7
Milliken Ave	9	5371	50	2	0.11	1,182		5.74		10.2
Haven Ave	9	7949	50	2	0.11	1,749		8.19		16.4
Hermosa Ave	3	645	50	2	0.34	438		0.74		1.1
Ramona Ave	3	215	50	2	0.34	146		0.25		0.4
Archibald Ave	9	3652	50	2	0.11	803		4.00		6.6
Amethyst Ave	3	2578	50	2	0.34	1,753		2.87		4.5
Base Line St	9	8594	50	2	0.11	1,891		8.77		18.1
Hellman Ave	3	2685	50	2	0.34	1,826		2.98		4.7
Grove Ave	9A	9453	50	2	0.11	2,080		9.52		20.6
11th St	NA	645	50	2	0.00	0		0.74		1.1
10th St	NA	645	50	2	0.00	0		0.74		1.1
9th St	NA	645	50	2	0.00	0		0.74		1.1
8th St	NA	645	50	2	0.00	0		0.74		1.1
Campus Ave	3	5156	50	2	0.34	3,506	8	5.53		9.7
6th St	3	645	50	2	0.34	438		0.74		1.1
3rd St	3	2685	50	2	0.34	1,826		2.98		4.7
2nd St	3	2041	50	2	0.34	1,388		2.28		3.5
1st St	3	1074	50	2	0.34	730		1.22		1.8
Euclid Ave	9	26425	50	2	0.11	5,814	3	19.83	8	141.7
Laurel Ave	NA	537	50	2	0.00	0		0.61		0.9
Palm Ave	NA	537	50	2	0.00	0		0.61		0.9
San Antonio Ave	3	7949	50	2	0.34	5,405	5	8.19		16.4
Mountain Ave	9	14394	40	2	0.11	3,167	10	20.93	7	45.0
Benson Ave	NA	3760	40	2	0.00	0		6.41		8.1
Central Ave	9A	15039	40	2	0.11	3,309	9	21.64	6	48.3
Claremont Blvd	9	0	30	2	0.11	0		0.00		0.0
Towne Ave	9	8552	30	2	0.11	1,881		24.15	4	27.1
Garey Ave	9	12568	30	4	0.11	5,530	4	33.38	2	46.1
Pine St	NA	8552	30	28	0.00	0		24.15	5	27.1
Fulton Rd	9	12568	30	8	0.11	11,060	1	33.38	1	46.1
White Ave	9	9778	30	8	0.11	8,605	2	27.11	3	32.3
Arrow Hwy	9	2148	30	4	0.11	945		6.64		5.6
E Street	3	1074	30	4	0.34	1,461		3.37		2.7
D Street	NA	5371	30	4	0.00	0		15.88	9	15.4
TOTALS:						**103,585**		**386.83**		752.7
LA VERNE TRANSFER STATION TO IRWINDALE TRANSFER STATION - SEGMENT 7										
San Dimas Cyn Rd	9	0	40	4	0.11	0		0.00		0.0
Walnut Ave	9A	161	40	4	0.11	71		0.29		0.3
San Dimas Ave	9	161	40	4	0.11	71		0.29		0.3
Cataract Ave	9A	161	40	4	0.11	71		0.29		0.3
Lone Hill Ave	9	430	40	4	0.11	189		0.77		0.8
Valley Center Ave	9	2890	40	4	0.11	1,271	7	4.99	8	6.1
Sunflower Ave	9A	4641	40	4	0.11	2,042	5	7.82	6	10.3
Covina Blvd	9A	3760	40	4	0.11	1,654	6	6.41	7	8.1
Bonnie Cove Ave	9	156	40	4	0.11	69		0.28		0.3
Cypress St	8	806	40	4	0.20	645	10	1.43	10	1.6
Glendora Ave	8	102	40	4	0.20	82		0.18		0.2

1996 DATA

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Grand Ave	9	2256	40	4	0.11	993	9	3.93	9	4.7
Barranca Ave	8	9668	30	4	0.20	7,734	1	26.85	2	31.8
Citrus Ave	9	2546	30	4	0.11	1,120	8	7.83	5	6.7
Hollenbeck Ave	8	8056	30	4	0.20	6,445	2	22.92	3	25.1
Azusa Ave	9	13857	30	4	0.11	6,097	3	36.05	1	53.5
Lark Ellen Ave	9	430	30	4	0.11	189		1.36		1.1
Vincent Ave	9A	430	30	4	0.11	189		1.36		1.1
Irwindale Ave	8	6678	30	4	0.20	5,343	4	19.38	4	19.9
TOTALS:						**34,274**		**142.41**		172.2
IRWINDALE TRANSFER STATION TO BASSETT JUNCTION - SEGMENT 8										
Cypress St	NA	21	20	4	0.00	0	3	0.15	3	0.1
Ramon Bl/Dowling Ave.	9	21	20	4	0.11	9	1	0.15	1	0.1
Pacific Ave	NA	21	20	4	0.00	0	4	0.15	4	0.1
MacDevitt St	NA	21	20	4	0.00	0	5	0.15	5	0.1
Merced Ave	NA	21	20	4	0.00	0	6	0.15	6	0.1
Francisquito Ave	9	21	20	4	0.11	9	2	0.15	2	0.1
Dalewood St	NA	21	20	4	0.00	0	7	0.15	7	0.1
Amar Rd	NA	21	20	4	0.00	0	8	0.15	8	0.1
TOTALS:						**19**		**1.23**		**0.6**

APPENDIX B
Traffic Count Data

DESERT CENTER

DESERT CENTER RICE ROAD / I-10 EASTBOUND RAMPS

TURNING MOVEMENT COUNT
AM - PM PEAK HOURS
AUGUST 1995

tel 909.**247.6716** fax 909.**924.8604**

25424 Jaclyn Avenue · Moreno Valley, CA · 92557

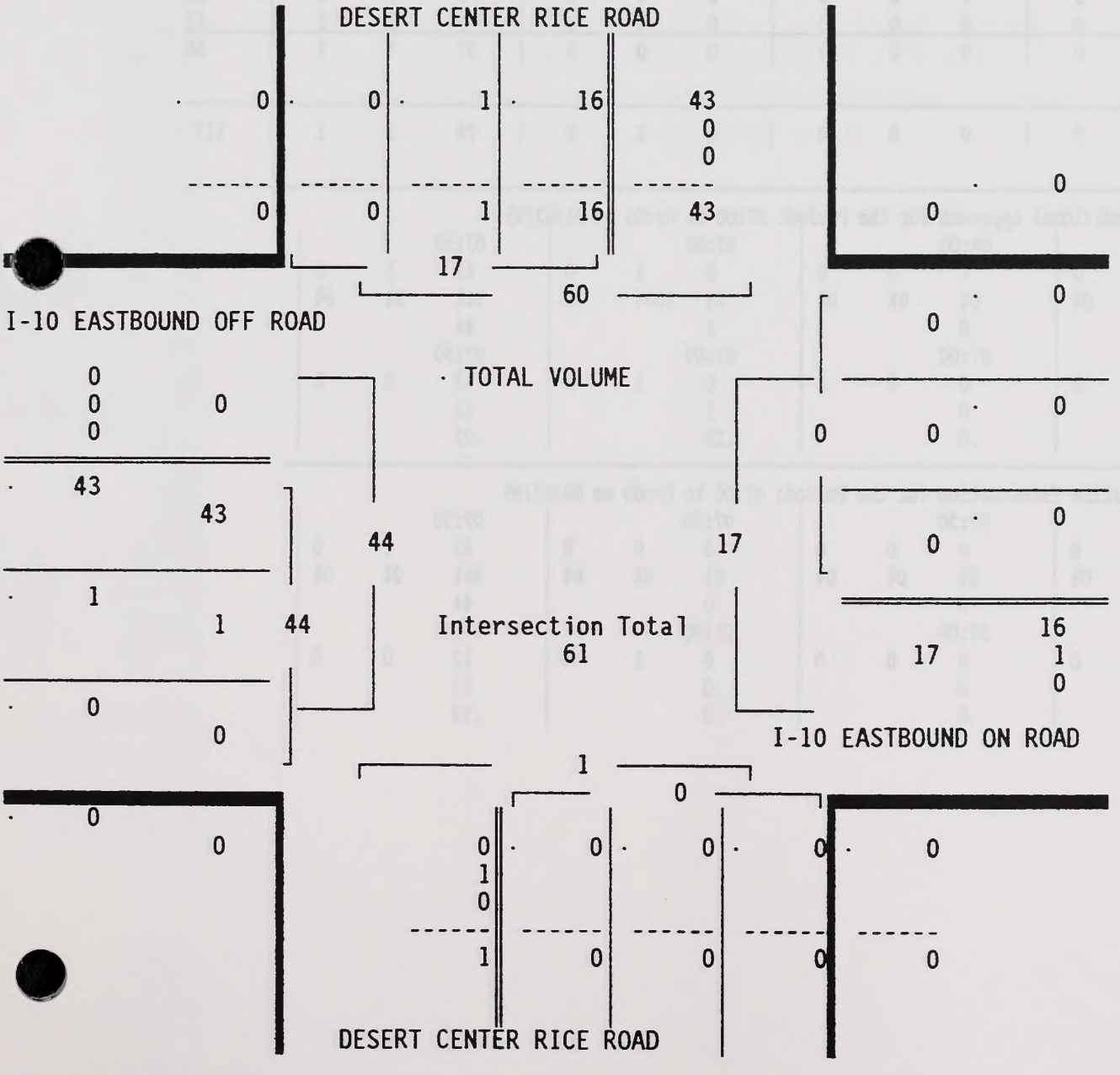
DESERT CENTER
N/S: DESERT CENTER RICE ROAD
E/W: I-10 EASTBOUND RAMPS
WEATHER: SUNNY

COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

Site Code : 00066801
Start Date: 08/02/95
File I.D. : DCDC10EA
Page : 1

TOTAL VOLUME

	DESERT CENTER RICE ROAD Southbound			I-10 EASTBOUND ON ROAD Westbound			DESERT CENTER RICE ROAD Northbound			I-10 EASTBOUND OFF ROAD Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Date 08/02/95													
Peak Hour Analysis By Entire Intersection for the Period: 07:00 to 09:00 on 08/02/95													
Peak start	07:30			07:30			07:30			07:30			
Volume	16	1	0	0	0	0	0	0	0	43	1	0	
Percent	94%	6%	0%	0%	0%	0%	0%	0%	0%	98%	2%	0%	
Pk total	17			0			0			44			
Highest	08:15			07:00			07:00			07:30			
Volume	8	0	0	0	0	0	0	1	0	12	0	0	
Hi total	8			0			0			12			
PHF	.53			.0			.0			.92			



COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

DESERT CENTER
N/S: DESERT CENTER RICE ROAD
E/W: I-10 EASTBOUND RAMPS
WEATHER: SUNNY

Site Code : 00066801
Start Date: 08/02/95
File I.D. : DCDC10EA
Page : 1

TOTAL VOLUME

	DESERT CENTER RICE ROAD Southbound			I-10 EASTBOUND ON ROAD Westbound			DESERT CENTER RICE ROAD Northbound			I-10 EASTBOUND OFF ROAD Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Date 08/02/95													
07:00	6	0	0	0	0	0	0	1	0	10	0	0	17
07:15	7	0	0	0	0	0	0	0	0	8	0	0	15
07:30	2	0	0	0	0	0	0	0	0	12	0	0	14
07:45	4	0	0	0	0	0	0	0	0	11	0	0	15
Hr Total	19	0	0	0	0	0	0	1	0	41	0	0	61
08:00	2	1	0	0	0	0	0	0	0	11	1	0	15
08:15	8	0	0	0	0	0	0	0	0	9	0	0	17
08:30	3	0	0	0	0	0	0	0	0	8	1	0	12
08:45	1	0	0	0	0	0	0	0	0	9	1	1	12
Hr Total	14	1	0	0	0	0	0	0	0	37	3	1	56
TOTAL	33	1	0	0	0	0	0	1	0	78	3	1	117

Peak Hour Analysis By Individual Approach for the Period: 07:00 to 09:00 on 08/02/95

Peak start	07:00			08:00			07:00			07:30		
Volume	19	0	0	0	0	0	0	1	0	43	1	0
Percent	100%	0%	0%	0%	0%	0%	0%	100%	0%	98%	2%	0%
Pk total	19			0			1			44		
Highest	07:15			07:00			07:00			07:30		
Volume	7	0	0	0	0	0	0	1	0	12	0	0
Hi total	7			0			1			12		
PHF	.68			.0			.25			.92		

Peak Hour Analysis By Entire Intersection for the Period: 07:00 to 09:00 on 08/02/95

Peak start	07:30			07:30			07:30			07:30		
Volume	16	1	0	0	0	0	0	0	0	43	1	0
Percent	94%	6%	0%	0%	0%	0%	0%	0%	0%	98%	2%	0%
Pk total	17			0			0			44		
Highest	08:15			07:00			07:00			07:30		
Volume	8	0	0	0	0	0	0	1	0	12	0	0
Hi total	8			0			0			12		
PHF	.53			.0			.0			.92		

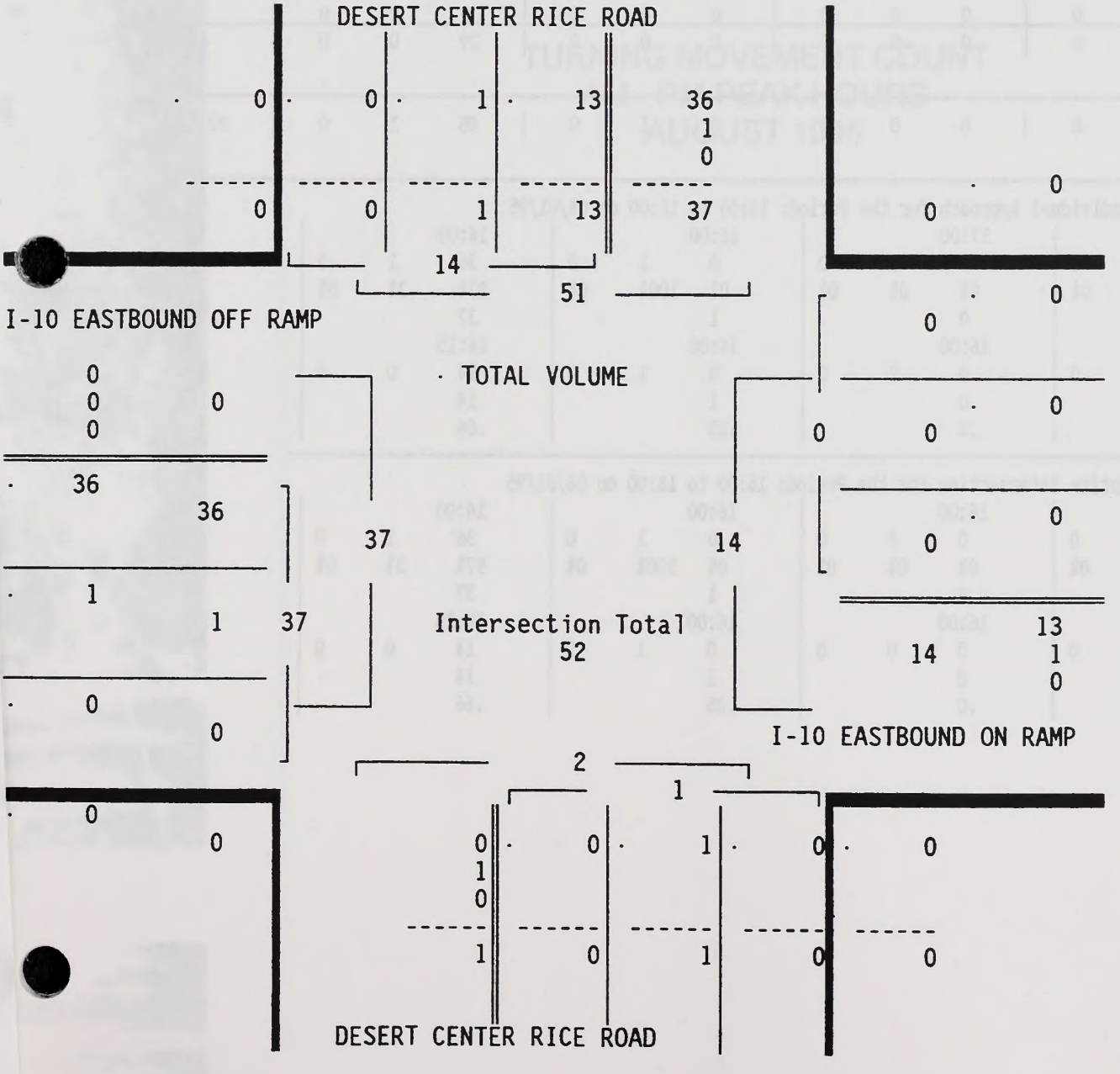
COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

DESERT CENTER
N/S: DESERT CENTER RICE ROAD
E/W: I-10 EASTBOUND RAMPS
WEATHER: SUNNY

Site Code : 00066801
Start Date: 08/01/95
File I.D. : DCDC10EP
Page : 1

TOTAL VOLUME

	DESERT CENTER RICE ROAD Southbound			I-10 EASTBOUND ON RAMP Westbound			DESERT CENTER RICE ROAD Northbound			I-10 EASTBOUND OFF RAMP Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Date 08/01/95													
Peak Hour Analysis By Entire Intersection for the Period: 16:00 to 18:00 on 08/01/95													
Peak start	16:00			16:00			16:00			16:00			
Volume	13	1	0	0	0	0	0	1	0	36	1	0	
Percent	93%	7%	0%	0%	0%	0%	0%	100%	0%	97%	3%	0%	
Pk total	14			0			1			37			
Highest	16:15			16:00			16:00			16:15			
Volume	4	0	0	0	0	0	0	1	0	14	0	0	
Hi total	4			0			1			14			
PHF	.88			.0			.25			.66			



COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

DESERT CENTER
N/S: DESERT CENTER RICE ROAD
E/W: I-10 EASTBOUND RAMPS
WEATHER: SUNNY

Site Code : 00066801
Start Date: 08/01/95
File I.D. : DCDC10EP
Page : 1

TOTAL VOLUME

	DESERT CENTER RICE ROAD Southbound			I-10 EASTBOUND ON RAMP Westbound			DESERT CENTER RICE ROAD Northbound			I-10 EASTBOUND OFF RAMP Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Date 08/01/95													
16:00	2	1	0	0	0	0	0	1	0	9	1	0	14
16:15	4	0	0	0	0	0	0	0	0	14	0	0	18
16:30	4	0	0	0	0	0	0	0	0	6	0	0	10
16:45	3	0	0	0	0	0	0	0	0	7	0	0	10
Hr Total	13	1	0	0	0	0	0	1	0	36	1	0	52
17:00	1	0	0	0	0	0	0	0	0	7	0	0	8
17:15	3	0	0	0	0	0	0	0	0	5	0	0	8
17:30	5	0	0	0	0	0	0	0	0	8	0	0	13
17:45	2	0	0	0	0	0	0	0	0	9	0	0	11
Hr Total	11	0	0	0	0	0	0	0	0	29	0	0	40
TOTAL	24	1	0	0	0	0	0	1	0	65	1	0	92

Peak Hour Analysis By Individual Approach for the Period: 16:00 to 18:00 on 08/01/95

Peak start	16:00			17:00			16:00			16:00		
Volume	13	1	0	0	0	0	0	1	0	36	1	0
Percent	93%	7%	0%	0%	0%	0%	0%	100%	0%	97%	3%	0%
Pk total	14			0			1			37		
Highest	16:15			16:00			16:00			16:15		
Volume	4	0	0	0	0	0	0	1	0	14	0	0
Hi total	4			0			1			14		
PHF	.88			.0			.25			.66		

Peak Hour Analysis By Entire Intersection for the Period: 16:00 to 18:00 on 08/01/95

Peak start	16:00			16:00			16:00			16:00		
Volume	13	1	0	0	0	0	0	1	0	36	1	0
Percent	93%	7%	0%	0%	0%	0%	0%	100%	0%	97%	3%	0%
Pk total	14			0			1			37		
Highest	16:15			16:00			16:00			16:15		
Volume	4	0	0	0	0	0	0	1	0	14	0	0
Hi total	4			0			1			14		
PHF	.88			.0			.25			.66		

DESERT CENTER
EAGLE MOUNTAIN ROAD / RAGSDALE ROAD

TURNING MOVEMENT COUNT
AM - PM PEAK HOURS
AUGUST 1995

25424 Jaclyn Avenue · Moreno Valley, CA · 92557
tel 909.**247.6716** fax 909.**924.8604**

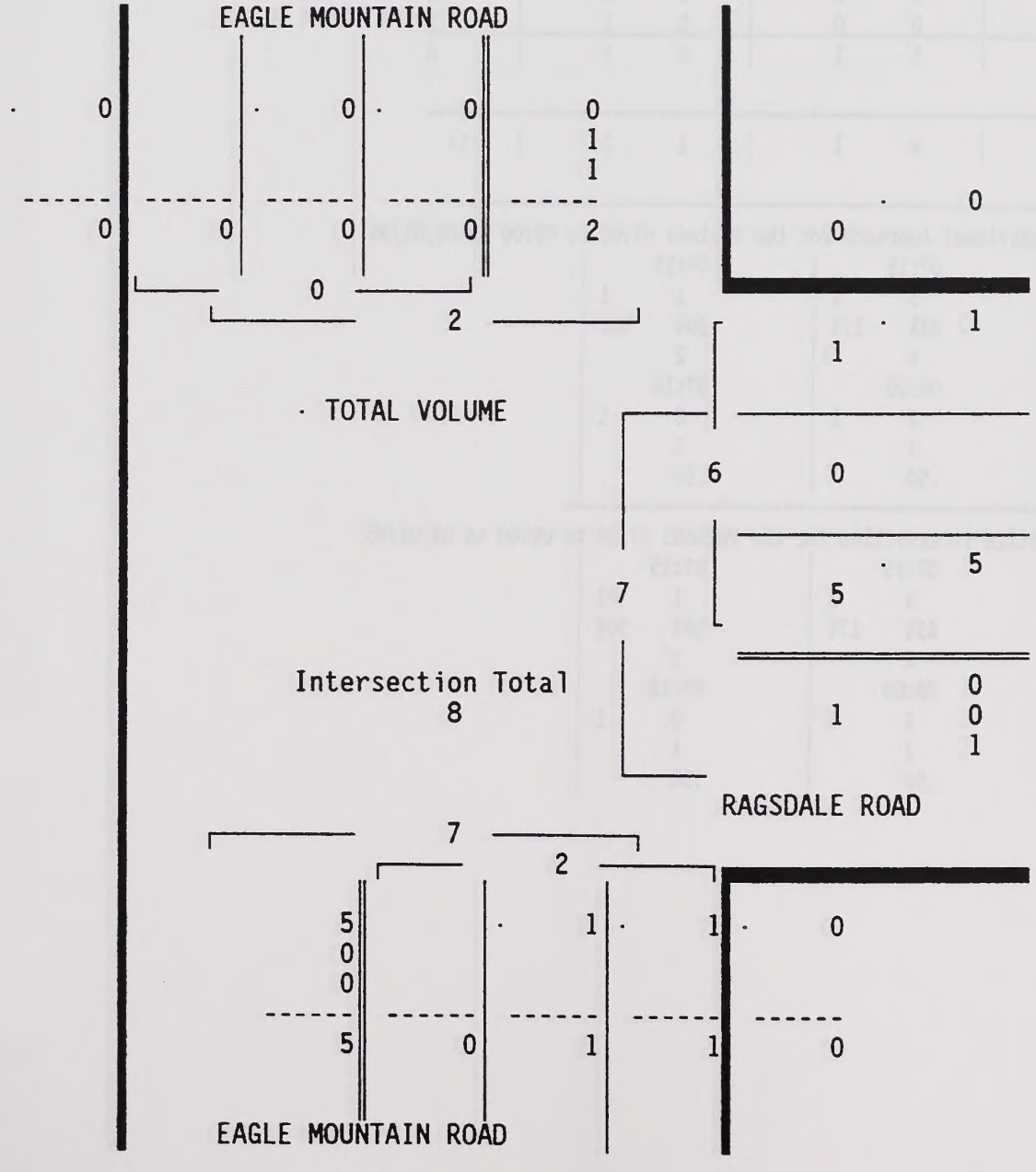
COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

DESERT CENTER
N/S: EAGLE MOUNTAIN ROAD
E/W: RAGSDALE ROAD
WEATHER: SUNNY

Site Code : 00066819
Start Date: 08/01/95
File I.D. : DCEMRAAM
Page : 1

TOTAL VOLUME

	EAGLE MOUNTAIN ROAD Southbound		RAGSDALE ROAD Westbound		EAGLE MOUNTAIN ROAD Northbound		
	Left	Thru	Left	Right	Thru	Right	Total
Date 08/01/95							
Peak Hour Analysis By Entire Intersection for the Period: 07:00 to 09:00 on 08/01/95							
Peak start	07:15		07:15		07:15		
Volume	0	0	5	1	1	1	
Percent	0%	0%	83%	17%	50%	50%	
Pk total	0		6		2		
Highest	07:00		08:00		07:15		
Volume	0	1	2	1	0	1	
Hi total	0		3		1		
PHF	.0		.50		.50		



COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

DESERT CENTER
N/S: EAGLE MOUNTAIN ROAD
E/W: RAGSDALE ROAD
WEATHER: SUNNY

Site Code : 00066819
Start Date: 08/01/95
File I.D. : DCEMRAAM
Page : 1

TOTAL VOLUME

	EAGLE MOUNTAIN ROAD Southbound		RAGSDALE ROAD Westbound		EAGLE MOUNTAIN ROAD Northbound		
	Left	Thru	Left	Right	Thru	Right	Total
Date 08/01/95							
07:00	0	1	2	0	0	0	3
07:15	0	0	1	0	0	1	2
07:30	0	0	2	0	1	0	3
07:45	0	0	0	0	0	0	0
Hr Total	0	1	5	0	1	1	8
08:00	0	0	2	1	0	0	3
08:15	0	0	0	0	0	0	0
08:30	0	0	1	0	0	0	1
08:45	1	0	0	0	0	1	2
Hr Total	1	0	3	1	0	1	6
TOTAL	1	1	8	1	1	2	14

Peak Hour Analysis By Individual Approach for the Period: 07:00 to 09:00 on 08/01/95

Peak start	08:00		07:15		07:15	
Volume	1	0	5	1	1	1
Percent	100%	0%	83%	17%	50%	50%
Pk total	1		6		2	
Highest	08:45		08:00		07:15	
Volume	1	0	2	1	0	1
Hi total	1		3		1	
PHF	.25		.50		.50	

Peak Hour Analysis By Entire Intersection for the Period: 07:00 to 09:00 on 08/01/95

Peak start	07:15		07:15		07:15	
Volume	0	0	5	1	1	1
Percent	0%	0%	83%	17%	50%	50%
Pk total	0		6		2	
Highest	07:00		08:00		07:15	
Volume	0	1	2	1	0	1
Hi total	0		3		1	
PHF	.0		.50		.50	

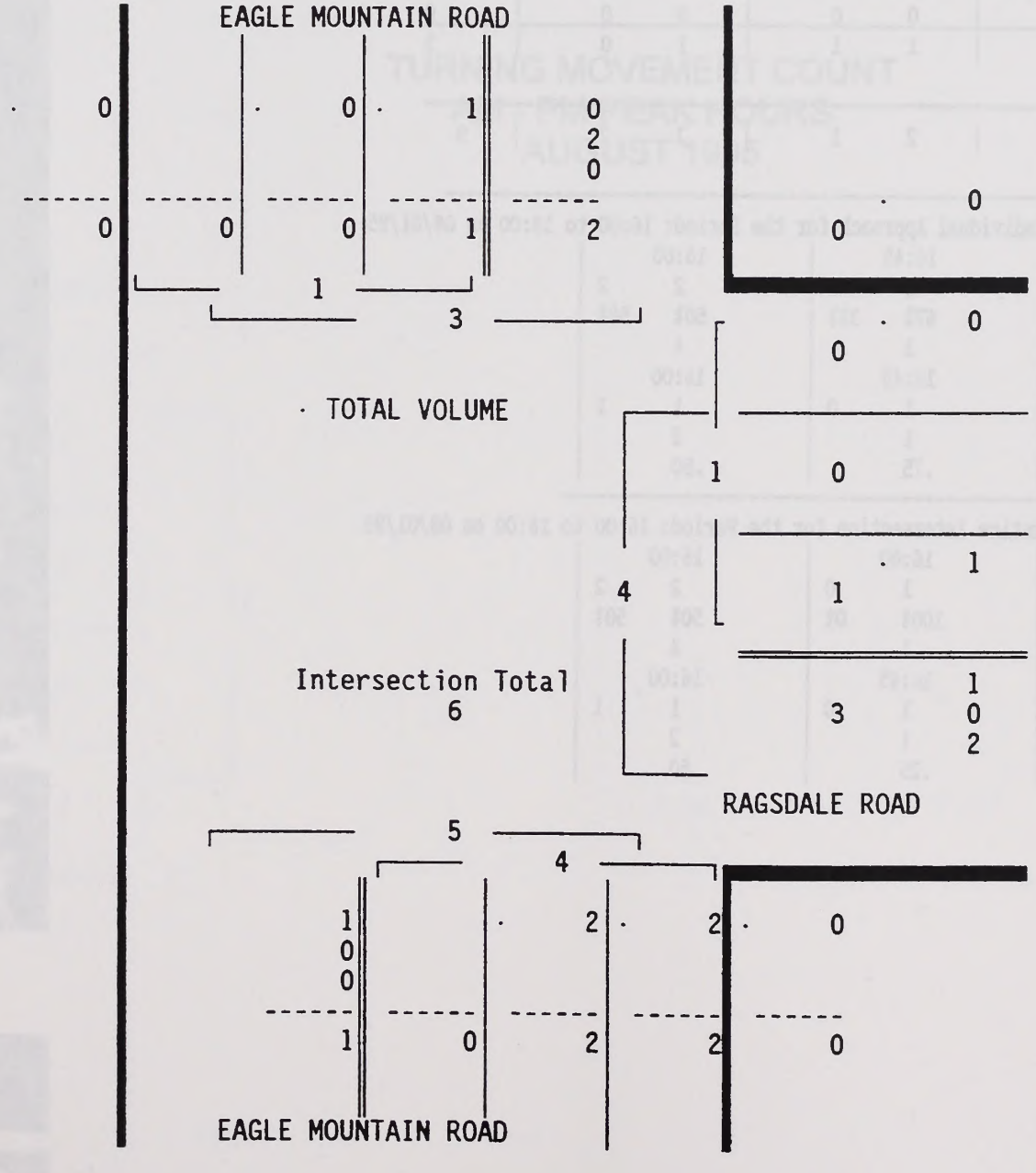
COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

DESERT CENTER
N/S: EAGLE MOUNTAIN ROAD
E/W: RAGSDALE ROAD
WEATHER: SUNNY

Site Code : 00066819
Start Date: 08/01/95
File I.D. : DCEMRAPM
Page : 1

TOTAL VOLUME

	EAGLE MOUNTAIN ROAD Southbound		RAGSDALE ROAD Westbound		EAGLE MOUNTAIN ROAD Northbound		
	Left	Thru	Left	Right	Thru	Right	Total
Date 08/01/95							
Peak Hour Analysis By Entire Intersection for the Period: 16:00 to 18:00 on 08/01/95							
Peak start	16:00		16:00		16:00		
Volume	1	0	1	0	2	2	
Percent	100%	0%	100%	0%	50%	50%	
Pk total	1		1		4		
Highest	16:00		16:45		16:00		
Volume	1	0	1	0	1	1	
Hi total	1		1		2		
PHF	.25		.25		.50		



DESERT CENTER
N/S: EAGLE MOUNTAIN ROAD
E/W: RAGSDALE ROAD
WEATHER: SUNNY

COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

Site Code : 00066819
Start Date: 08/01/95
File I.D. : DCEMRAPM
Page : 1

TOTAL VOLUME

	EAGLE MOUNTAIN ROAD Southbound		RAGSDALE ROAD Westbound		EAGLE MOUNTAIN ROAD Northbound		
	Left	Thru	Left	Right	Thru	Right	Total
Date 08/01/95							
16:00	1	0	0	0	1	1	3
16:15	0	0	0	0	0	1	1
16:30	0	0	0	0	0	0	0
16:45	0	0	1	0	1	0	2
Hr Total	1	0	1	0	2	2	6
17:00	0	0	0	1	0	0	1
17:15	0	0	0	0	0	0	0
17:30	0	0	1	0	1	0	2
17:45	0	0	0	0	0	0	0
Hr Total	0	0	1	1	1	0	3
TOTAL	1	0	2	1	3	2	9

Peak Hour Analysis By Individual Approach for the Period: 16:00 to 18:00 on 08/01/95

Peak start	16:00		16:45		16:00	
Volume	1	0	2	1	2	2
Percent	100%	0%	67%	33%	50%	50%
Pk total	1		3		4	
Highest	16:00		16:45		16:00	
Volume	1	0	1	0	1	1
Hi total	1		1		2	
PHF	.25		.75		.50	

Peak Hour Analysis By Entire Intersection for the Period: 16:00 to 18:00 on 08/01/95

Peak start	16:00		16:00		16:00	
Volume	1	0	1	0	2	2
Percent	100%	0%	100%	0%	50%	50%
Pk total	1		1		4	
Highest	16:00		16:45		16:00	
Volume	1	0	1	0	1	1
Hi total	1		1		2	
PHF	.25		.25		.50	

DESERT CENTER

DESERT CENTER RICE ROAD / I-10 WESTBOUND RAMPS

TURNING MOVEMENT COUNT
AM - PM PEAK HOURS
AUGUST 1995

tel 909.247.6716 fax 909.924.8604

25424 Jaclyn Avenue · Moreno Valley, CA · 92557

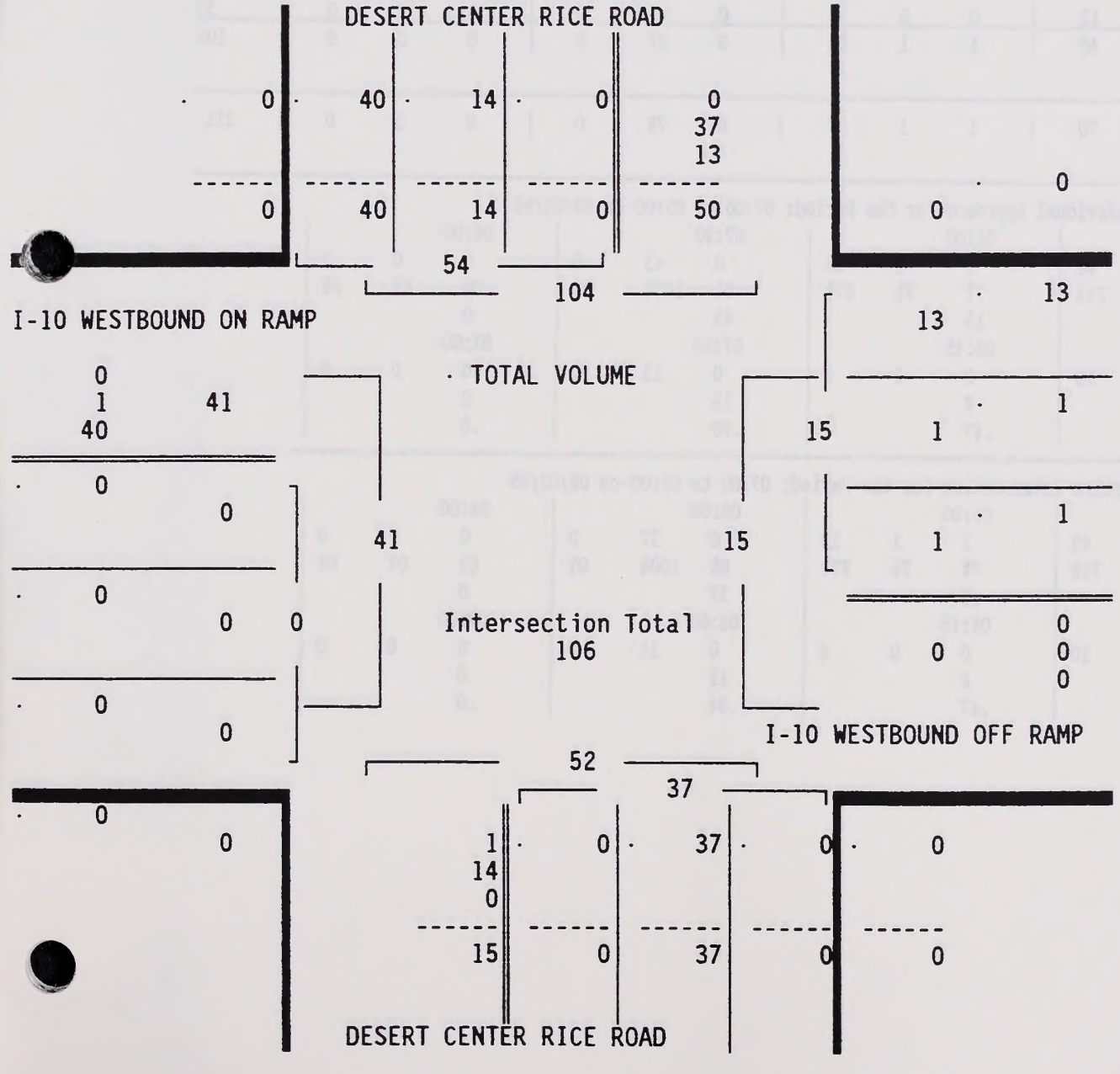
DESERT CENTER
N/S: DESERT CENTER RICE ROAD
E/W: I-10 WESTBOUND RAMPS
WEATHER: SUNNY

COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

Site Code : 00066801
Start Date: 08/02/95
File I.D. : DCDC10WA
Page : 1

TOTAL VOLUME

	DESERT CENTER RICE ROAD Southbound			I-10 WESTBOUND OFF RAMP Westbound			DESERT CENTER RICE ROAD Northbound			I-10 WESTBOUND ON RAMP Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Date 08/02/95													
Peak Hour Analysis By Entire Intersection for the Period: 07:00 to 09:00 on 08/02/95													
Peak start	08:00			08:00			08:00			08:00			
Volume	0	14	40	1	1	13	0	37	0	0	0	0	
Percent	0%	26%	74%	7%	7%	87%	0%	100%	0%	0%	0%	0%	
Pk total	54			15			37			0			
Highest	08:15			08:45			08:00			07:00			
Volume	0	8	10	0	0	8	0	11	0	0	0	0	
Hi total	18			8			11			0			
PHF	.75			.47			.84			.0			



COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

DESERT CENTER
N/S: DESERT CENTER RICE ROAD
E/W: I-10 WESTBOUND RAMPS
WEATHER: SUNNY

Site Code : 00066801
Start Date: 08/02/95
File I.D. : DCDC10WA
Page : 1

TOTAL VOLUME

	DESERT CENTER RICE ROAD Southbound			I-10 WESTBOUND OFF RAMP Westbound			DESERT CENTER RICE ROAD Northbound			I-10 WESTBOUND ON RAMP Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Date 08/02/95													
07:00	0	7	11	0	0	3	0	10	0	0	0	0	31
07:15	0	7	11	0	0	3	0	8	0	0	0	0	29
07:30	0	2	4	0	0	3	0	12	0	0	0	0	21
07:45	0	4	4	0	0	5	0	11	0	0	0	0	24
Hr Total	0	20	30	0	0	14	0	41	0	0	0	0	105
08:00	0	2	9	1	0	1	0	11	0	0	0	0	24
08:15	0	8	10	0	0	3	0	9	0	0	0	0	30
08:30	0	3	9	0	1	1	0	8	0	0	0	0	22
08:45	0	1	12	0	0	8	0	9	0	0	0	0	30
Hr Total	0	14	40	1	1	13	0	37	0	0	0	0	106
TOTAL	0	34	70	1	1	27	0	78	0	0	0	0	211

Peak Hour Analysis By Individual Approach for the Period: 07:00 to 09:00 on 08/02/95

Peak start	08:00			08:00			07:30			08:00		
Volume	0	14	40	1	1	13	0	43	0	0	0	0
Percent	0%	26%	74%	7%	7%	87%	0%	100%	0%	0%	0%	0%
Pk total	54			15			43			0		
Highest	08:15			08:45			07:30			07:00		
Volume	0	8	10	0	0	8	0	12	0	0	0	0
Hi total	18			8			12			0		
PHF	.75			.47			.90			.0		

Peak Hour Analysis By Entire Intersection for the Period: 07:00 to 09:00 on 08/02/95

Peak start	08:00			08:00			08:00			08:00		
Volume	0	14	40	1	1	13	0	37	0	0	0	0
Percent	0%	26%	74%	7%	7%	87%	0%	100%	0%	0%	0%	0%
Pk total	54			15			37			0		
Highest	08:15			08:45			08:00			07:00		
Volume	0	8	10	0	0	8	0	11	0	0	0	0
Hi total	18			8			11			0		
PHF	.75			.47			.84			.0		

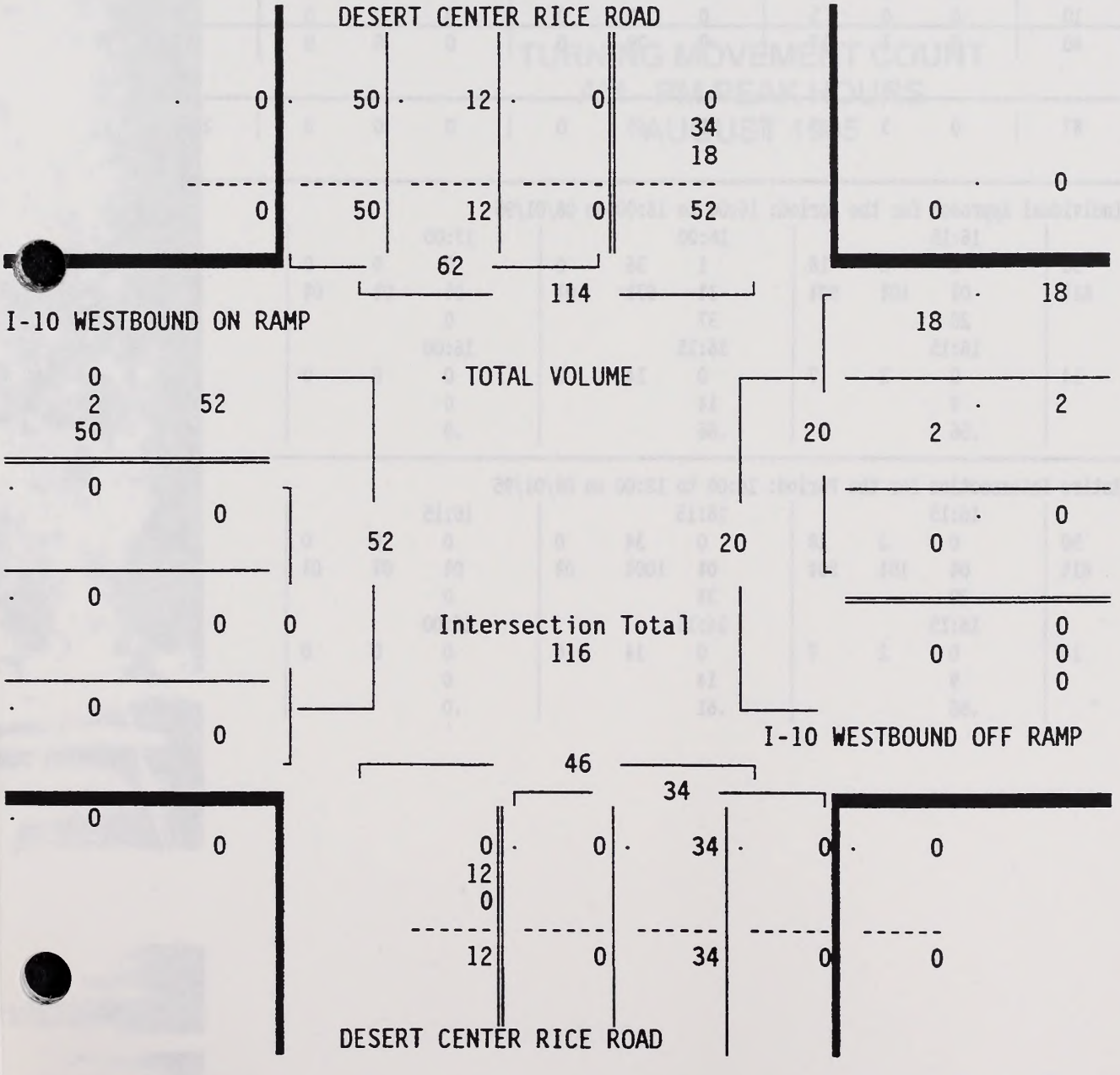
DESERT CENTER
N/S: DESERT CENTER RICE ROAD
E/W: I-10 WESTBOUND RAMPS
WEATHER: SUNNY

COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

Site Code : 00066801
Start Date: 08/01/95
File I.D. : DCDC10WP
Page : 1

TOTAL VOLUME

	DESERT CENTER RICE ROAD Southbound			I-10 WESTBOUND OFF RAMP Westbound			DESERT CENTER RICE ROAD Northbound			I-10 WESTBOUND ON RAMP Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Date 08/01/95													
Peak Hour Analysis By Entire Intersection for the Period: 16:00 to 18:00 on 08/01/95													
Peak start	16:15			16:15			16:15			16:15			
Volume	0	12	50	0	2	18	0	34	0	0	0	0	
Percent	0%	19%	81%	0%	10%	90%	0%	100%	0%	0%	0%	0%	
Pk total	62			20			34			0			
Highest	16:30			16:15			16:15			16:00			
Volume	0	4	14	0	2	7	0	14	0	0	0	0	
Hi total	18			9			14			0			
PHF	.86			.56			.61			.0			



DESERT CENTER
N/S: DESERT CENTER RICE ROAD
E/W: I-10 WESTBOUND RAMPS
WEATHER: SUNNY

COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

Site Code : 00066801
Start Date: 08/01/95
File I.D. : DCDC10WP

TOTAL VOLUME

	DESERT CENTER RICE ROAD Southbound			I-10 WESTBOUND OFF RAMP Westbound			DESERT CENTER RICE ROAD Northbound			I-10 WESTBOUND ON RAMP Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Date 08/01/95													
16:00	0	2	13	0	0	3	1	9	0	0	0	0	28
16:15	0	4	9	0	2	7	0	14	0	0	0	0	36
16:30	0	4	14	0	0	2	0	6	0	0	0	0	26
16:45	0	3	11	0	0	4	0	7	0	0	0	0	25
Hr Total	0	13	47	0	2	16	1	36	0	0	0	0	115
17:00	0	1	16	0	0	5	0	7	0	0	0	0	29
17:15	0	3	8	0	0	3	0	5	0	0	0	0	19
17:30	0	5	6	0	1	4	0	8	0	0	0	0	24
17:45	0	2	10	0	0	5	0	9	0	0	0	0	26
Hr Total	0	11	40	0	1	17	0	29	0	0	0	0	98
TOTAL	0	24	87	0	3	33	1	65	0	0	0	0	213

Peak Hour Analysis By Individual Approach for the Period: 16:00 to 18:00 on 08/01/95

Peak start	16:15			16:15			16:00			17:00		
Volume	0	12	50	0	2	18	1	36	0	0	0	0
Percent	0%	19%	81%	0%	10%	90%	3%	97%	0%	0%	0%	0%
Pk total	62			20			37			0		
Highest	16:30			16:15			16:15			16:00		
Volume	0	4	14	0	2	7	0	14	0	0	0	0
Hi total	18			9			14			0		
PHF	.86			.56			.66			.0		

Peak Hour Analysis By Entire Intersection for the Period: 16:00 to 18:00 on 08/01/95

Peak start	16:15			16:15			16:15			16:15		
Volume	0	12	50	0	2	18	0	34	0	0	0	0
Percent	0%	19%	81%	0%	10%	90%	0%	100%	0%	0%	0%	0%
Pk total	62			20			34			0		
Highest	16:30			16:15			16:15			16:00		
Volume	0	4	14	0	2	7	0	14	0	0	0	0
Hi total	18			9			14			0		
PHF	.86			.56			.61			.0		

DESERT CENTER

EAGLE MOUNTAIN ROAD / I-10 WESTBOUND RAMPS

TURNING MOVEMENT COUNT
AM - PM PEAK HOURS
AUGUST 1995

tel 909.**247.6716** fax 909.**924.8604**

25424 Jaclyn Avenue · Moreno Valley, CA · 92557

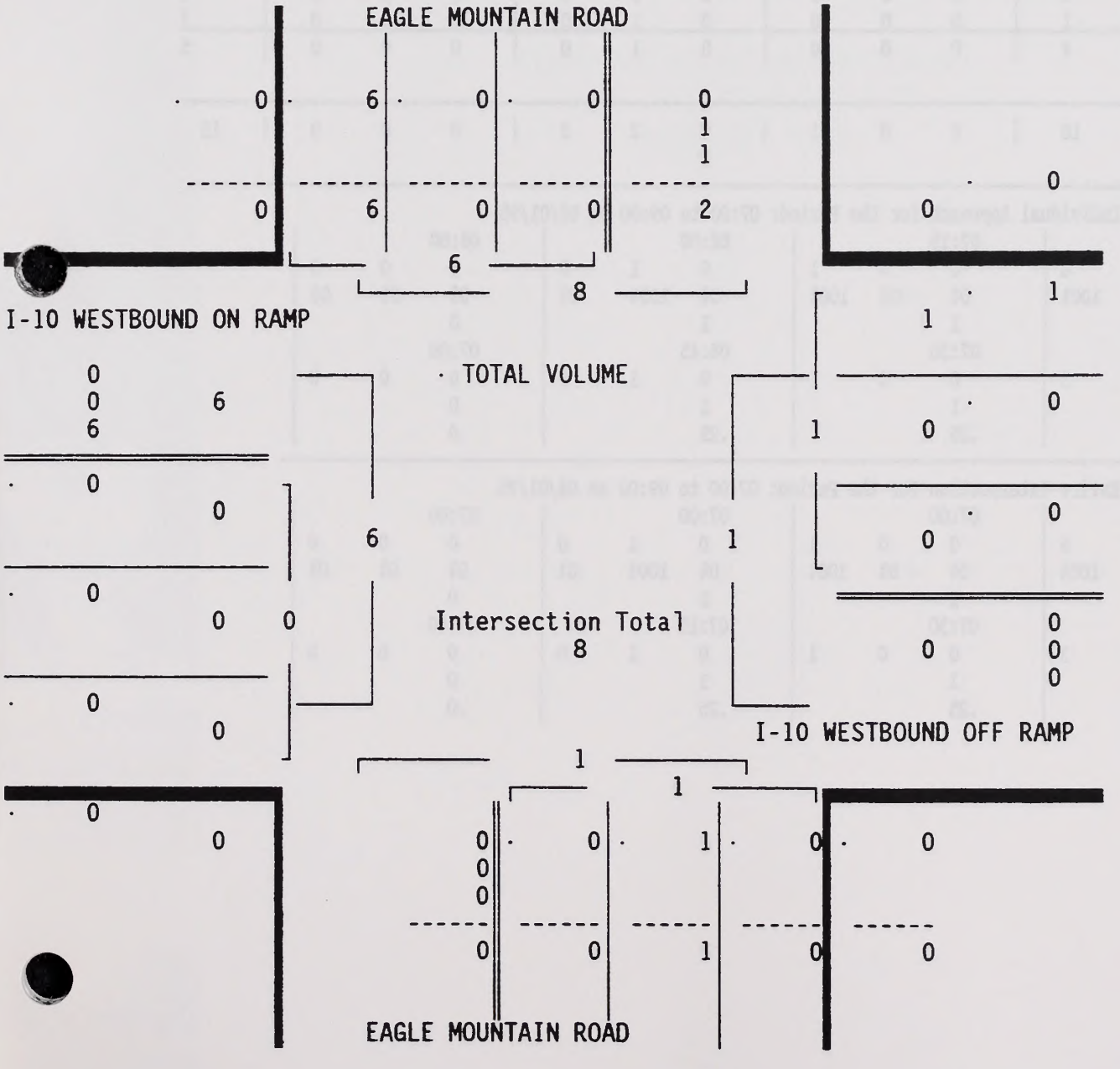
DESERT CENTER
N/S: EAGLE MOUNTAIN ROAD
E/W: I-10 WESTBOUND RAMPS
WEATHER: SUNNY

COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

Site Code : 00066808
Start Date: 08/01/95
File I.D. : DCEM10WA
Page : 1

TOTAL VOLUME

	EAGLE MOUNTAIN ROAD Southbound			I-10 WESTBOUND OFF RAMP Westbound			EAGLE MOUNTAIN ROAD Northbound			I-10 WESTBOUND ON RAMP Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Date 08/01/95													
Peak Hour Analysis By Entire Intersection for the Period: 07:00 to 09:00 on 08/01/95													
Peak start	07:00			07:00			07:00			07:00			
Volume	0	0	6	0	0	1	0	1	0	0	0	0	
Percent	0%	0%	100%	0%	0%	100%	0%	100%	0%	0%	0%	0%	
Pk total	6			1			1			0			
Highest	07:00			07:30			07:15			07:00			
Volume	0	0	3	0	0	1	0	1	0	0	0	0	
Hi total	3			1			1			0			
PHF	.50			.25			.25			.0			



DESERT CENTER
N/S: EAGLE MOUNTAIN ROAD
E/W: I-10 WESTBOUND RAMPS
WEATHER: SUNNY

COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

Site Code : 00066808
Start Date: 08/01/95
File I.D. : DCEM10WA
Page : 1

TOTAL VOLUME

	EAGLE MOUNTAIN ROAD Southbound			I-10 WESTBOUND OFF RAMP Westbound			EAGLE MOUNTAIN ROAD Northbound			I-10 WESTBOUND ON RAMP Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Date 08/01/95													
07:00	0	0	3	0	0	0	0	0	0	0	0	0	3
07:15	0	0	1	0	0	0	0	1	0	0	0	0	2
07:30	0	0	2	0	0	1	0	0	0	0	0	0	3
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0
Hr Total	0	0	6	0	0	1	0	1	0	0	0	0	8
08:00	0	0	2	0	0	0	0	0	0	0	0	0	2
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	1	0	0	0	0	0	0	0	0	0	1
08:45	0	0	1	0	0	0	0	1	0	0	0	0	2
Hr Total	0	0	4	0	0	0	0	1	0	0	0	0	5
TOTAL	0	0	10	0	0	1	0	2	0	0	0	0	13

Peak Hour Analysis By Individual Approach for the Period: 07:00 to 09:00 on 08/01/95

Peak start	07:00			07:15			08:00			08:00		
Volume	0	0	6	0	0	1	0	1	0	0	0	0
Percent	0%	0%	100%	0%	0%	100%	0%	100%	0%	0%	0%	0%
Pk total	6			1			1			0		
Highest	07:00			07:30			08:45			07:00		
Volume	0	0	3	0	0	1	0	1	0	0	0	0
Hi total	3			1			1			0		
PHF	.50			.25			.25			.0		

Peak Hour Analysis By Entire Intersection for the Period: 07:00 to 09:00 on 08/01/95

Peak start	07:00			07:00			07:00			07:00		
Volume	0	0	6	0	0	1	0	1	0	0	0	0
Percent	0%	0%	100%	0%	0%	100%	0%	100%	0%	0%	0%	0%
Pk total	6			1			1			0		
Highest	07:00			07:30			07:15			07:00		
Volume	0	0	3	0	0	1	0	1	0	0	0	0
Hi total	3			1			1			0		
PHF	.50			.25			.25			.0		

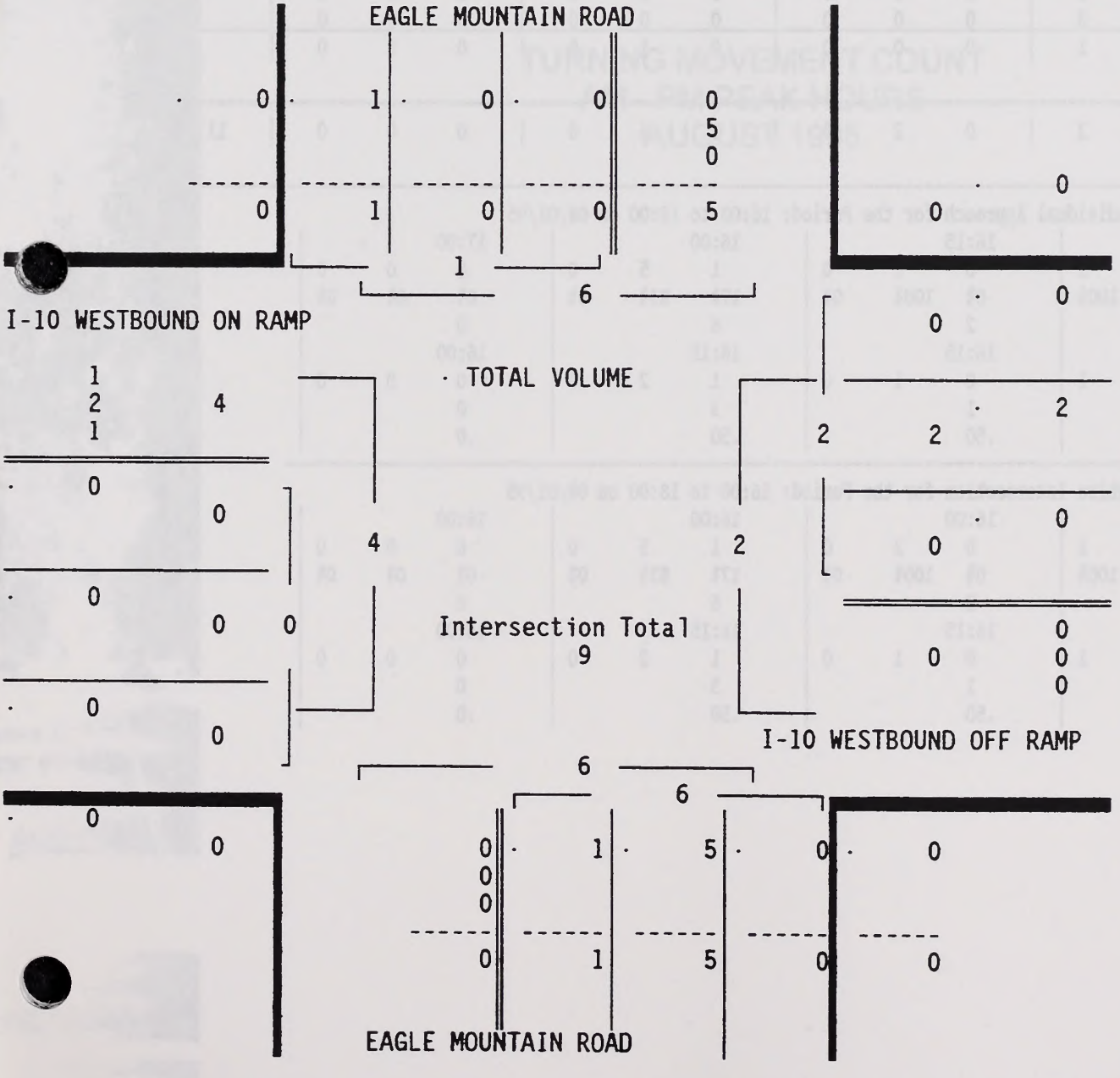
DESERT CENTER
N/S: EAGLE MOUNTAIN ROAD
E/W: I-10 WESTBOUND RAMPS
WEATHER: SUNNY

COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

Site Code : 00066808
Start Date: 08/01/95
File I.D. : DCEM10WP
Page : 1

TOTAL VOLUME

	EAGLE MOUNTAIN ROAD Southbound			I-10 WESTBOUND OFF RAMP Westbound			EAGLE MOUNTAIN ROAD Northbound			I-10 WESTBOUND ON RAMP Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Date 08/01/95													
Peak Hour Analysis By Entire Intersection for the Period: 16:00 to 18:00 on 08/01/95													
Peak start	16:00			16:00			16:00			16:00			
Volume	0	0	1	0	2	0	1	5	0	0	0	0	
Percent	0%	0%	100%	0%	100%	0%	17%	83%	0%	0%	0%	0%	
Pk total	1			2			6			0			
Highest	16:45			16:15			16:15			16:00			
Volume	0	0	1	0	1	0	1	2	0	0	0	0	
Hi total	1			1			3			0			
PHF	.25			.50			.50			.0			



DESERT CENTER
N/S: EAGLE MOUNTAIN ROAD
E/W: I-10 WESTBOUND RAMPS
WEATHER: SUNNY

COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

Site Code : 00066808
Start Date: 08/01/95
File I.D. : DCEM10WP
Page : 1

TOTAL VOLUME

	EAGLE MOUNTAIN ROAD Southbound			I-10 WESTBOUND OFF RAMP Westbound			EAGLE MOUNTAIN ROAD Northbound			I-10 WESTBOUND ON RAMP Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Date 08/01/95													
16:00	0	0	0	0	0	0	0	2	0	0	0	0	2
16:15	0	0	0	0	1	0	1	2	0	0	0	0	4
16:30	0	0	0	0	1	0	0	0	0	0	0	0	1
16:45	0	0	1	0	0	0	0	1	0	0	0	0	2
Hr Total	0	0	1	0	2	0	1	5	0	0	0	0	9
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	1	0	0	0	0	1	0	0	0	0	2
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0
Hr Total	0	0	1	0	0	0	0	1	0	0	0	0	2
TOTAL	0	0	2	0	2	0	1	6	0	0	0	0	11

Peak Hour Analysis By Individual Approach for the Period: 16:00 to 18:00 on 08/01/95

Peak start	16:45			16:15			16:00			17:00		
Volume	0	0	2	0	2	0	1	5	0	0	0	0
Percent	0%	0%	100%	0%	100%	0%	17%	83%	0%	0%	0%	0%
Pk total	2			2			6			0		
Highest	16:45			16:15			16:15			16:00		
Volume	0	0	1	0	1	0	1	2	0	0	0	0
Hi total	1			1			3			0		
PHF	.50			.50			.50			.0		

Peak Hour Analysis By Entire Intersection for the Period: 16:00 to 18:00 on 08/01/95

Peak start	16:00			16:00			16:00			16:00		
Volume	0	0	1	0	2	0	1	5	0	0	0	0
Percent	0%	0%	100%	0%	100%	0%	17%	83%	0%	0%	0%	0%
Pk total	1			2			6			0		
Highest	16:45			16:15			16:15			16:00		
Volume	0	0	1	0	1	0	1	2	0	0	0	0
Hi total	1			1			3			0		
PHF	.25			.50			.50			.0		

DESERT CENTER

EAGLE MOUNTAIN ROAD / I-10 EASTBOUND RAMPS

TURNING MOVEMENT COUNT
AM - PM PEAK HOURS
AUGUST 1995

tel 909.**247.6716** fax 909.**924.8604**

25424 Jaclyn Avenue · Moreno Valley, CA · 92557

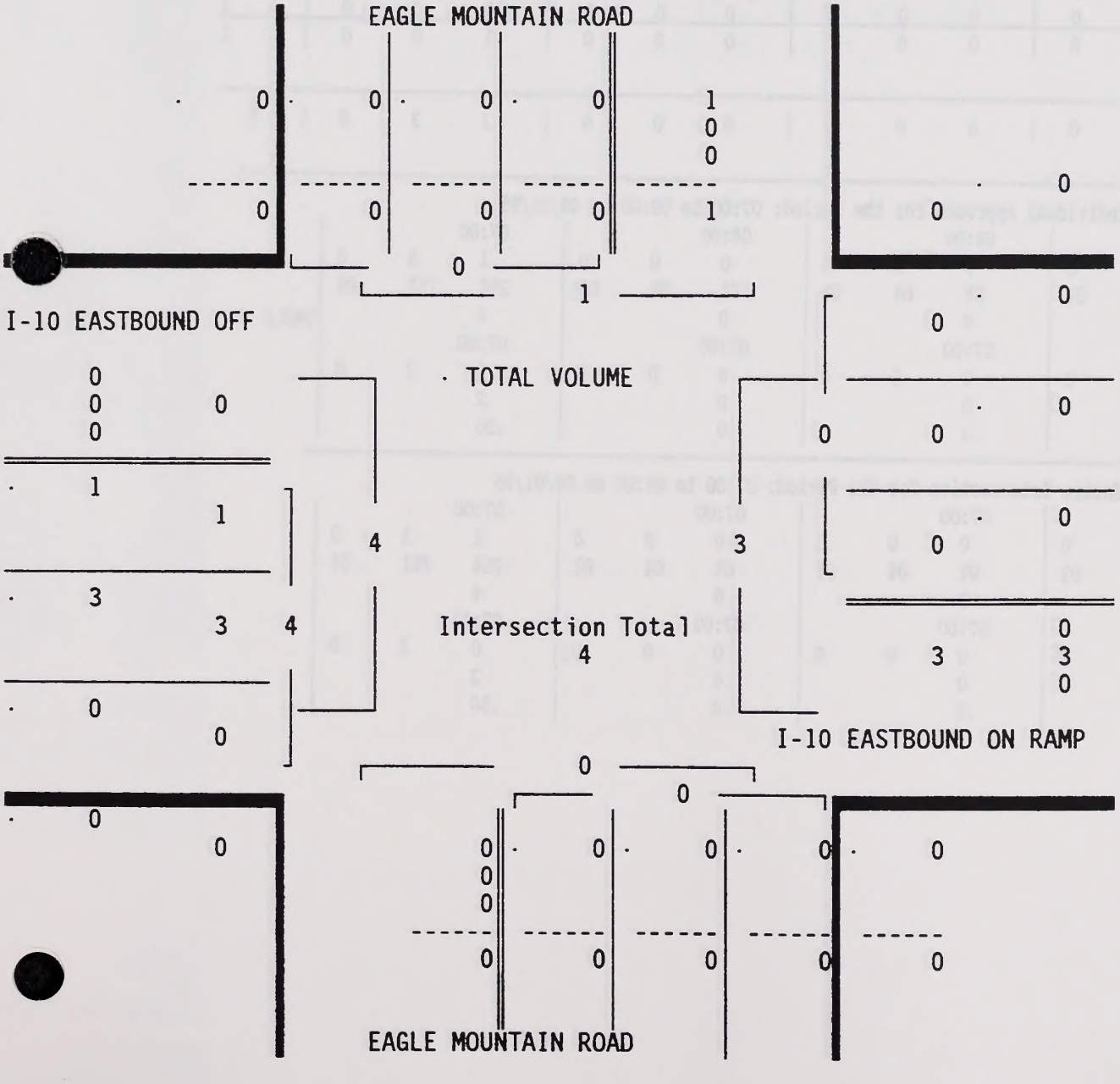
DESERT CENTER
N/S: EAGLE MOUNTAIN ROAD
E/W: I-10 EASTBOUND RAMPS
WEATHER: SUNNY

COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

Site Code : 00066808
Start Date: 08/01/95
File I.D. : DCEM10EA
Page : 1

TOTAL VOLUME

	EAGLE MOUNTAIN ROAD Southbound			I-10 EASTBOUND ON RAMP Westbound			EAGLE MOUNTAIN ROAD Northbound			I-10 EASTBOUND OFF Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Date 08/01/95													
Peak Hour Analysis By Entire Intersection for the Period: 07:00 to 09:00 on 08/01/95													
Peak start	07:00			07:00			07:00			07:00			
Volume	0	0	0	0	0	0	0	0	0	1	3	0	
Percent	0%	0%	0%	0%	0%	0%	0%	0%	0%	25%	75%	0%	
Pk total	0			0			0			4			
Highest	07:00			07:00			07:00			07:00			
Volume	0	0	0	0	0	0	0	0	0	0	2	0	
Hi total	0			0			0			2			
PHF	.0			.0			.0			.50			



DESERT CENTER
N/S: EAGLE MOUNTAIN ROAD
E/W: I-10 EASTBOUND RAMPS
WEATHER: SUNNY

COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

Site Code : 00066808
Start Date: 08/01/95
File I.D. : DCEM10EA
Page : 1

TOTAL VOLUME

	EAGLE MOUNTAIN ROAD Southbound			I-10 EASTBOUND ON RAMP Westbound			EAGLE MOUNTAIN ROAD Northbound			I-10 EASTBOUND OFF Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Date 08/01/95													
07:00	0	0	0	0	0	0	0	0	0	0	2	0	2
07:15	0	0	0	0	0	0	0	0	0	1	0	0	1
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	1	0	1
Hr Total	0	0	0	0	0	0	0	0	0	1	3	0	4
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0	1	0	0	1
Hr Total	0	0	0	0	0	0	0	0	0	1	0	0	1
TOTAL	0	0	0	0	0	0	0	0	0	2	3	0	5

Peak Hour Analysis By Individual Approach for the Period: 07:00 to 09:00 on 08/01/95

Peak start	08:00			08:00			08:00			07:00		
Volume	0	0	0	0	0	0	0	0	0	1	3	0
Percent	0%	0%	0%	0%	0%	0%	0%	0%	0%	25%	75%	0%
Pk total	0			0			0			4		
Highest	07:00			07:00			07:00			07:00		
Volume	0	0	0	0	0	0	0	0	0	0	2	0
Hi total	0			0			0			2		
PHF	.0			.0			.0			.50		

Peak Hour Analysis By Entire Intersection for the Period: 07:00 to 09:00 on 08/01/95

Peak start	07:00			07:00			07:00			07:00		
Volume	0	0	0	0	0	0	0	0	0	1	3	0
Percent	0%	0%	0%	0%	0%	0%	0%	0%	0%	25%	75%	0%
Pk total	0			0			0			4		
Highest	07:00			07:00			07:00			07:00		
Volume	0	0	0	0	0	0	0	0	0	0	2	0
Hi total	0			0			0			2		
PHF	.0			.0			.0			.50		

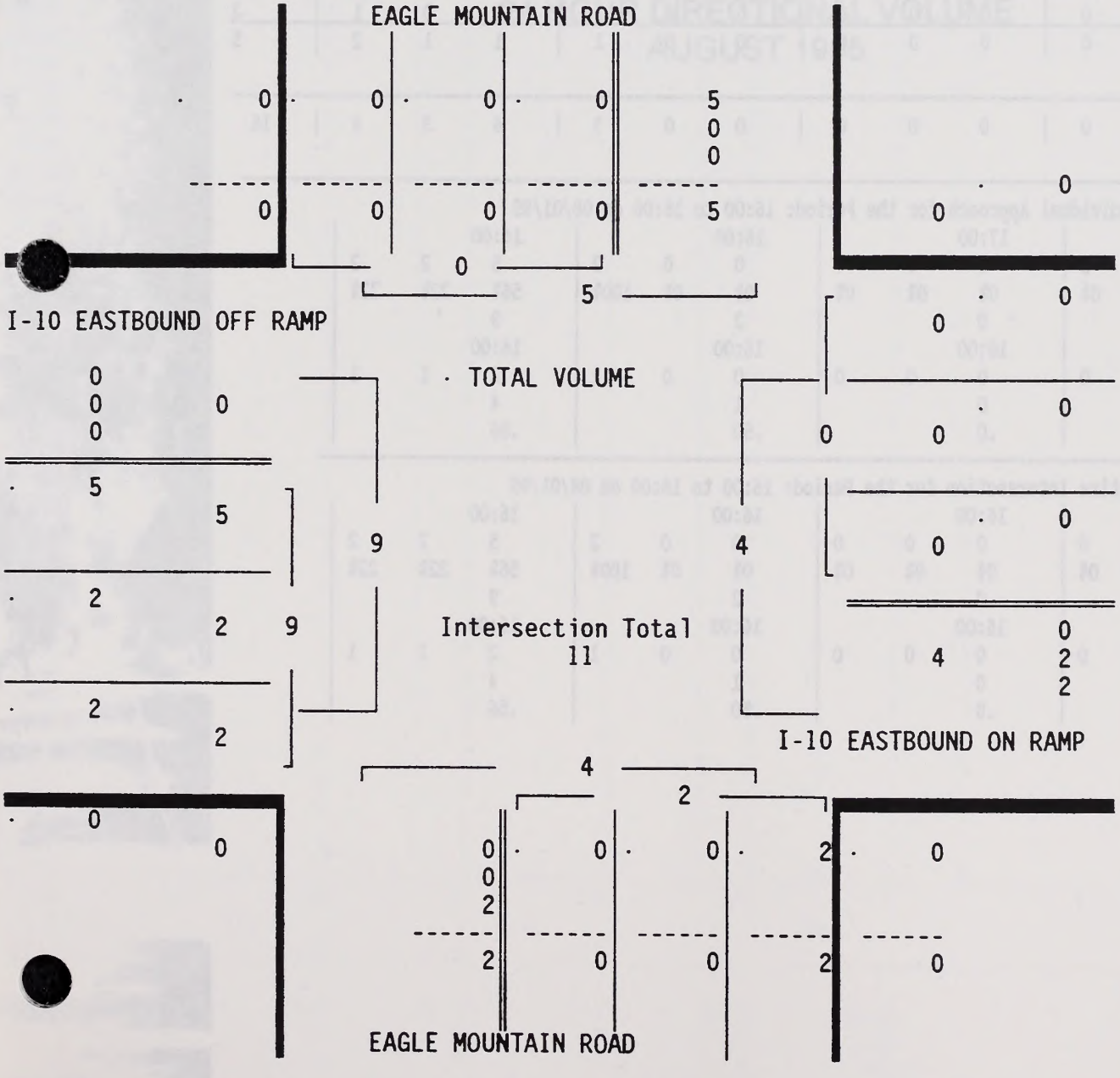
COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

DESERT CENTER
N/S: EAGLE MOUNTAIN ROAD
E/W: I-10 EASTBOUND RAMPS
WEATHER: SUNNY

Site Code : 00066808
Start Date: 08/01/95
File I.D. : DCEM10EP
Page : 1

TOTAL VOLUME

	EAGLE MOUNTAIN ROAD Southbound			I-10 EASTBOUND ON RAMP Westbound			EAGLE MOUNTAIN ROAD Northbound			I-10 EASTBOUND OFF RAMP Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Date 08/01/95													
Peak Hour Analysis By Entire Intersection for the Period: 16:00 to 18:00 on 08/01/95													
Peak start	16:00			16:00			16:00			16:00			
Volume	0	0	0	0	0	0	0	0	2	5	2	2	
Percent	0%	0%	0%	0%	0%	0%	0%	0%	100%	56%	22%	22%	
Pk total	0			0			2			9			
Highest	16:00			16:00			16:00			16:00			
Volume	0	0	0	0	0	0	0	0	1	2	1	1	
Hi total	0			0			1			4			
PHF	.0			.0			.50			.56			



DESERT CENTER
N/S: EAGLE MOUNTAIN ROAD
E/W: I-10 EASTBOUND RAMPS
WEATHER: SUNNY

COUNTS UNLIMITED
25424 JACLYN AVENUE
MORENO VALLEY, CA 92557
909-247-6716

Site Code : 00066808
Start Date: 08/01/95
File I.D. : DCEM10EP
Page : 1

TOTAL VOLUME

	EAGLE MOUNTAIN ROAD Southbound			I-10 EASTBOUND ON RAMP Westbound			EAGLE MOUNTAIN ROAD Northbound			I-10 EASTBOUND OFF RAMP Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Date 08/01/95													
16:00	0	0	0	0	0	0	0	0	1	2	1	1	5
16:15	0	0	0	0	0	0	0	0	0	2	0	0	2
16:30	0	0	0	0	0	0	0	0	1	0	0	1	2
16:45	0	0	0	0	0	0	0	0	0	1	1	0	2
Hr Total	0	0	0	0	0	0	0	0	2	5	2	2	11
17:00	0	0	0	0	0	0	0	0	0	0	1	0	1
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	1	0	1	2
17:45	0	0	0	0	0	0	0	0	1	0	0	1	2
Hr Total	0	0	0	0	0	0	0	0	1	1	1	2	5
TOTAL	0	0	0	0	0	0	0	0	3	6	3	4	16

Peak Hour Analysis By Individual Approach for the Period: 16:00 to 18:00 on 08/01/95

Peak start	17:00			17:00			16:00			16:00			
Volume	0	0	0	0	0	0	0	0	2	5	2	2	
Percent	0%	0%	0%	0%	0%	0%	0%	0%	100%	56%	22%	22%	
Pk total	0			0			2			9			
Highest	16:00			16:00			16:00			16:00			
Volume	0	0	0	0	0	0	0	0	1	2	1	1	
Hi total	0			0			1			4			
PHF	.0			.0			.50			.56			

Peak Hour Analysis By Entire Intersection for the Period: 16:00 to 18:00 on 08/01/95

Peak start	16:00			16:00			16:00			16:00			
Volume	0	0	0	0	0	0	0	0	2	5	2	2	
Percent	0%	0%	0%	0%	0%	0%	0%	0%	100%	56%	22%	22%	
Pk total	0			0			2			9			
Highest	16:00			16:00			16:00			16:00			
Volume	0	0	0	0	0	0	0	0	1	2	1	1	
Hi total	0			0			1			4			
PHF	.0			.0			.50			.56			



DESERT CENTER
KAISER ROAD / NORTH OF LAKE TAMARISK DRIVE

24 HOUR DIRECTIONAL VOLUME
AUGUST 1995

tel 909.247.6716 fax 909.924.8604

25424 Jaclyn Avenue · Moreno Valley, CA · 92557

DESERT CENTER
KAISER RD/NORTH OF LAKE TAMARISK
TUESDAY, AUGUST 1, 1995

COUNTS UNLIMITED
909.247.6716

NORTH/SOUTH

Site Code : 06682818
Start Date: 08/01/95
File I.D. : DCKANLT
Page : 1

Begin	<------ NBND ------>				<------ SBND ------>				<------Combined ------>			
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.	
12:00 08/01	0		4		1		2		1		6	
12:15	0		2		0		2		0		4	
12:30	0		5		0		3		0		8	
12:45	0	*	1	12	0	1	3	10	0	1	4	22
01:00	0		4		0		4		0		8	
01:15	0		4		0		2		0		6	
01:30	0		3		0		2		0		5	
01:45	0	*	0	11	0	*	2	10	0	*	2	21
02:00	0		2		0		2		0		4	
02:15	0		3		0		1		0		4	
02:30	0		5		0		1		0		6	
02:45	0	*	1	11	0	*	4	8	0	*	5	19
03:00	0		2		0		1		0		3	
03:15	1		2		1		5		2		7	
03:30	0		2		0		5		0		7	
03:45	0	1	0	6	0	1	3	14	0	2	3	20
04:00	1		2		1		1		2		3	
04:15	0		2		0		3		0		5	
04:30	0		3		0		3		0		6	
04:45	0	1	1	8	3	4	3	10	3	5	4	18
05:00	0		0		2		3		2		3	
05:15	0		4		0		2		0		6	
05:30	0		0		3		3		3		3	
05:45	3	3	2	6	0	5	5	13	3	8	7	19
06:00	0		2		0		0		0		2	
06:15	1		2		1		1		2		3	
06:30	3		2		0		1		3		3	
06:45	5	9	2	8	3	4	1	3	8	13	3	11
07:00	4		2		3		0		7		2	
07:15	1		1		3		2		4		3	
07:30	4		1		0		3		4		4	
07:45	2	11	2	6	1	7	0	5	3	18	2	11
08:00	4		4		1		1		5		5	
08:15	0		2		4		1		4		3	
08:30	0		1		1		0		1		1	
08:45	2	6	0	7	3	9	0	2	5	15	0	9
09:00	3		2		4		2		7		4	
09:15	3		0		2		1		5		1	
09:30	0		2		2		1		2		3	
09:45	2	8	1	5	1	9	2	6	3	17	3	11
10:00	3		1		3		1		6		2	
10:15	0		1		0		1		0		2	
10:30	4		1		1		0		5		1	
10:45	0	7	0	3	2	6	0	2	2	13	0	5
11:00	1		2		4		0		5		2	
11:15	3		0		3		0		6		0	
11:30	3		1		1		1		4		2	
11:45	5	12	0	3	3	11	1	2	8	23	1	5
Totals	58		86		57		85		115		171	
Day Totals		144				142				286		
Split %	50.4%		50.2%		49.5%		49.7%					
Peak Hour	06:45		00:30		08:15		02:45		06:45		00:30	
	14		14		12		15		23		26	
	.7		.7		.75		.75		.71		.81	

DESERT CENTER
KAISER ROAD / NORTH OF DESERT CENTER RICE ROAD

24 HOUR DIRECTIONAL VOLUME
AUGUST 1995

tel 909.247.6716 fax 909.924.8604

25424 Joclyn Avenue · Moreno Valley, CA · 92557

DESERT CENTER
KAISER RD/N/O DESERT CENTER RICE RD
TUESDAY, AUGUST 1, 1995

COUNTS UNLIMITED
909.247.6716

Site Code : 06682723
Start Date: 08/01/95
File I.D. : DCKANDC
Page : 1

NORTH/SOUTH

Begin	<------ NBND ------>				<------ SBND ------>				<------Combined ------>			
T[illegible]	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.	
12:[illegible] 08/01	1		1		0		2		1		3	
12:15	0		4		0		2		0		6	
12:30	0		4		0		3		0		7	
12:45	0	1	4	13	1	1	6	13	1	2	10	26
01:00	1		4		0		9		1		13	
01:15	0		4		0		5		0		9	
01:30	0		2		0		1		0		3	
01:45	0	1	1	11	1	1	0	15	1	2	1	26
02:00	1		4		0		3		1		7	
02:15	0		6		0		3		0		9	
02:30	0		3		0		3		0		6	
02:45	0	1	2	15	0	*	4	13	0	1	6	28
03:00	0		3		0		1		0		4	
03:15	0		6		1		2		1		8	
03:30	1		1		0		4		1		5	
03:45	1	2	1	11	0	1	4	11	1	3	5	22
04:00	0		4		1		4		1		8	
04:15	0		4		0		6		0		10	
04:30	0		2		0		5		0		7	
04:45	0	*	3	13	4	5	4	19	4	5	7	32
05:00	0		3		5		2		5		5	
05:15	0		4		3		6		3		10	
05:30	2		3		5		4		7		7	
05:45	2	4	6	16	2	15	3	15	4	19	9	31
06:00	0		3		1		0		1		3	
06:[illegible]	1		3		1		1		2		4	
06:30	3		0		1		3		4		3	
06:45	1	5	5	11	5	8	4	8	6	13	9	19
07:00	3		1		1		3		4		4	
07:15	1		1		4		1		5		2	
07:30	2		2		1		1		3		3	
07:45	3	9	3	7	4	10	2	7	7	19	5	14
08:00	1		4		3		1		4		5	
08:15	0		1		7		2		7		3	
08:30	3		2		1		0		4		2	
08:45	4	8	4	11	6	17	1	4	10	25	5	15
09:00	5		0		10		2		15		2	
09:15	0		5		6		0		6		5	
09:30	5		2		5		2		10		4	
09:45	2	12	2	9	6	27	3	7	8	39	5	16
10:00	6		2		4		1		10		3	
10:15	4		2		3		1		7		3	
10:30	4		1		1		0		5		1	
10:45	2	16	2	7	4	12	0	2	6	28	2	9
11:00	4		0		5		0		9		0	
11:15	1		1		1		0		2		1	
11:30	5		1		4		0		9		1	
11:45	2	12	3	5	3	13	0	*	5	25	3	5
Totals	71		129		110		114		181		243	
Day Totals		200				224				424		
Split %	39.2%		53.0%		60.7%		46.9%					
Peak Hour	09:30		00:15		08:45		00:30		08:45		00:30	
	17		16		27		23		41		39	
	.70		1.00		.67		.63		.68		.75	



DESERT CENTER

DESERT CENTER RICE ROAD / BETWEEN I-10 RAMPS

24 HOUR DIRECTIONAL VOLUME
AUGUST 1995

tel 909.247.6716 fax 909.924.8604

25424 Jaclyn Avenue · Moreno Valley, CA · 92557

DESERT CENTER
DESERT CENTER RICE RD/
BETWEEN I-10 RAMPS
TUESDAY, AUGUST 1, 1995

COUNTS UNLIMITED
909.247.6716

Site Code : 066811
Start Date: 08/01/95
File I.D. : DCDC10EW
Page : 1

NORTH/SOUTH

Begin Time	<------ SBND		------><------ NBND		------><------Combined		------>	
	A.M.		P.M.		A.M.		P.M.	
12:00 08/01	6		4		7		9	
12:15	10		2		16		6	
12:30	10		11		20		16	
12:45	9	35	11	28	2	45	15	46
01:00	10		8		18		15	
01:15	18		10		12		13	
01:30	6		7		24		17	
01:45	13	47	11	36	9	63	10	55
02:00	5		9		8		23	
02:15	7		8		14		11	
02:30	24		7		14		8	
02:45	1	37	7	31	4	40	14	56
03:00	9		7		11		8	
03:15	11		7		11		21	
03:30	8		6		18		10	
03:45	16	44	5	25	6	46	9	48
04:00	7		6		9		15	
04:15	20		7		4		20	
04:30	3		6		1		9	
04:45	3	33	6	25	12	26	12	56
05:00	12		3		16		13	
05:15	13		5		17		9	
05:30	29		10		3		14	
05:45	3	57	4	22	9	45	13	49
06:00	7		6		9		10	
06:15	3		10		6		6	
06:30	8		2		2		2	
06:45	5	23	7	25	22	39	4	22
07:00	10		5		16		9	
07:15	10		3		14		3	
07:30	3		6		19		11	
07:45	11	34	6	20	18	67	12	35
08:00	5		12		16		7	
08:15	14		1		14		4	
08:30	9		14		15		7	
08:45	3	31	5	32	16	61	8	26
09:00	11		1		15		14	
09:15	12		8		13		15	
09:30	2		3		15		7	
09:45	3	28	2	14	12	55	9	45
10:00	12		5		11		19	
10:15	6		0		19		13	
10:30	8		8		5		14	
10:45	1	27	9	22	12	47	10	56
11:00	9		2		12		16	
11:15	6		3		10		17	
11:30	5		13		23		13	
11:45	7	27	8	26	12	57	13	59
Totals	423		306		591		553	
Day Totals		729				1144		
Split %	41.7%		35.6%		58.2%		64.3%	

Peak Hour	04:45		00:30		06:45		01:15		01:00		01:15	
	57		40		71		63		110		100	
	.49		.90		.80		.68		.91		.78	

Totals	1014		859									
Day Totals		1873										
Split %												
Peak Hour	01:00		01:15									
	110		100									
	.91		.78									

counts unlimited

DESERT CENTER
EAGLE MOUNTAIN ROAD / NORTH OF RAGSDALE ROAD

24 HOUR DIRECTIONAL VOLUME
AUGUST 1995

tel 909.247.6716 fax 909.924.8604

25424 Jaclyn Avenue · Moreno Valley, CA · 92557

DESERT CENTER
EAGLE MTN/NORTH OF RAGSDALE
TUESDAY, AUGUST 1, 1995

COUNTS UNLIMITED
909.247.6716

Site Code : 066817
Start Date: 08/01/95
File I.D. : DCEMNRNS
Page : 1

NORTH/SOUTH

Begin	<------ NBND ------>				<------ SBND ------>				<------Combined ------>			
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.	
12:[illegible]08/01	0		0		1		0		1		0	
12:15	0		0		0		0		0		0	
12:30	0		0		1		1		1		1	
12:45	0	*	0	*	0	2	0	1	0	2	0	1
01:00	0		1		0		2		0		3	
01:15	0		0		0		0		0		0	
01:30	0		1		0		2		0		3	
01:45	0	*	0	2	0	*	0	4	0	*	0	6
02:00	0		0		0		0		0		0	
02:15	0		0		0		0		0		0	
02:30	0		0		0		0		0		0	
02:45	0	*	0	*	0	*	0	*	0	*	0	*
03:00	0		0		0		0		0		0	
03:15	1		0		1		1		2		1	
03:30	1		0		1		0		2		0	
03:45	0	2	0	*	0	2	0	1	0	4	0	1
04:00	0		1		0		1		0		2	
04:15	0		0		0		0		0		0	
04:30	0		0		0		0		0		0	
04:45	0	*	1	2	0	*	0	1	0	*	1	3
05:00	0		1		0		0		0		1	
05:15	0		0		0		0		0		0	
05:30	0		1		0		0		0		1	
05:45	0	*	0	2	1	1	0	*	1	1	0	2
06:00	0		0		0		0		0		0	
06:[illegible]	0		0		0		0		0		0	
06:[illegible]	0		0		0		0		0		0	
06:45	0	*	0	*	0	*	0	*	0	*	0	*
07:00	0		0		1		0		1		0	
07:15	0		0		0		0		0		0	
07:30	1		0		0		0		1		0	
07:45	0	1	0	*	0	1	0	*	0	2	0	*
08:00	1		0		0		0		1		0	
08:15	0		1		0		0		0		1	
08:30	0		0		0		0		0		0	
08:45	0	1	0	1	1	1	1	1	1	2	1	2
09:00	0		0		0		0		0		0	
09:15	1		0		0		0		1		0	
09:30	0		0		2		0		2		0	
09:45	0	1	0	*	0	2	0	*	0	3	0	*
10:00	0		0		1		0		1		0	
10:15	0		0		0		1		0		1	
10:30	0		0		0		0		0		0	
10:45	0	*	0	*	0	1	0	1	0	1	0	1
11:00	0		0		0		0		0		0	
11:15	0		0		1		0		1		0	
11:30	0		0		0		0		0		0	
11:45	0	*	0	*	0	1	0	*	0	1	0	*
Totals	5		7		11		9		16		16	
Day Totals		12				20				32		
Split %	31.2%		43.7%		68.7%		56.2%					
Peak Hour	02:45		04:45		08:45		00:45		02:45		00:45	
	2		3		3		4		4		6	
	.5		.75		.37		.5		.5		.5	



DESERT CENTER
EAGLE MOUNTAIN ROAD / BETWEEN I-10 RAMPS

24 HOUR DIRECTIONAL VOLUME
AUGUST 1995

tel 909.**247.6716** fax 909.**924.8604**

25424 Jaclyn Avenue · Moreno Valley, CA · 92557

DESERT CENTER
EAGLE MOUNTAIN/BET I-10 RAMPS
TUESDAY, AUGUST 1, 1995

COUNTS UNLIMITED
909.247.6716

Site Code : 06682221
Start Date: 08/01/95
File I.D. : DCEM10EW
Page : 1

NORTH/SOUTH

Begin	<------ NBND ------>				<------ SBND ------>				<------Combined ------>			
	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.	
[illegible] 08/01	2		0		0		0		2		0	
12:15	0		0		0		0		0		0	
12:30	0		0		0		0		0		0	
12:45	0	2	2	2	2	2	0	*	2	4	2	2
01:00	0		0		0		0		0		0	
01:15	0		0		0		0		0		0	
01:30	3		1		0		0		3		1	
01:45	0	3	0	1	0	*	0	*	0	3	0	1
02:00	0		0		0		0		0		0	
02:15	0		1		0		0		0		1	
02:30	0		0		0		0		0		0	
02:45	1	1	0	1	0	*	0	*	1	1	0	1
03:00	2		1		0		0		2		1	
03:15	1		0		0		0		1		0	
03:30	6		0		0		0		6		0	
03:45	0	9	1	2	0	*	0	*	0	9	1	2
04:00	0		2		0		0		0		2	
04:15	0		3		0		0		0		3	
04:30	0		0		0		0		0		0	
04:45	0	*	1	6	0	*	0	*	0	*	1	6
05:00	0		0		0		0		0		0	
05:15	0		0		0		0		0		0	
05:30	0		1		0		0		0		1	
05:45	0	*	0	1	0	*	0	*	0	*	0	1
06:00	0		0		0		0		0		0	
[illegible]	2		0		0		0		2		0	
06:30	0		0		2		0		2		0	
06:45	0	2	4	4	0	2	0	*	0	4	4	4
07:00	0		0		0		0		0		0	
07:15	3		0		0		0		3		0	
07:30	0		2		0		0		0		2	
07:45	0	3	0	2	0	*	0	*	0	3	0	2
08:00	0		1		0		0		0		1	
08:15	0		0		0		0		0		0	
08:30	0		1		0		0		0		1	
08:45	2	2	0	2	1	1	0	*	3	3	0	2
09:00	2		0		1		0		3		0	
09:15	0		0		0		0		0		0	
09:30	1		0		0		0		1		0	
09:45	0	3	0	*	0	1	0	*	0	4	0	*
10:00	0		1		0		0		0		1	
10:15	0		1		0		0		0		1	
10:30	0		0		0		0		0		0	
10:45	1	1	0	2	0	*	0	*	1	1	0	2
11:00	1		0		0		1		1		1	
11:15	0		0		0		0		0		0	
11:30	1		0		0		0		1		0	
11:45	1	3	5	5	0	*	0	1	1	3	5	6
Totals	29		28		6		1		35		29	
Day Totals		57				7				64		
Split %	82.8%		96.5%		17.1%		3.4%					
Peak Hour	02:45		03:30		00:00		10:15		02:45		03:30	
	10		6		2		1		10		6	
	.41		.5		.25		.25		.41		.5	



DESERT CENTER

EAGLE MOUNTAIN ROAD / BET RAGSDALE & I-10 RAMPS

24 HOUR AXLE CLASSIFICATION COUNT
NORTHBOUND/SOUTHBOUND
AUGUST 1995

tel 909.**247.6716** fax 909.**924.8604**

25424 Jaclyn Avenue · Moreno Valley, CA · 92557

DESERT CENTER
EAGLE MOUNTAIN ROAD/
BET RAGSDALE AND I-10 RAMPS
TRUCK CLASSIF/TUESDAY, AUG 1,'95

COUNTS UNLIMITED
909.247.6716

NORTHBOUND

Site Code : 066808
Start Date: 08/01/95
File I.D. : DCEMSRCN

Begin Time	Bikes	Cars & Tlrs	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 08/01	0	1	0	0	0	0	0	0	0	0	0	0	0	1
01:00	0	1	0	0	0	0	0	0	0	0	1	0	0	2
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	5	2	0	1	0	0	0	0	0	0	0	0	8
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	0	0	1	0	0	0	0	0	0	0	0	0	0	1
06:00	0	0	0	0	0	0	0	0	0	0	1	0	0	1
07:00	0	0	1	0	0	0	0	0	0	0	1	0	0	2
08:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
09:00	0	4	1	0	0	0	0	1	0	0	0	0	0	6
10:00	0	0	1	0	0	0	0	0	0	0	0	0	0	1
11:00	0	0	1	0	0	0	0	0	0	0	0	0	0	1
12:00 pm	0	0	2	0	0	0	0	0	0	0	0	0	0	2
01:00	0	4	2	0	0	0	0	0	0	0	0	0	0	6
02:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
03:00	0	0	2	0	0	0	0	0	0	0	0	0	0	2
04:00	0	4	0	0	0	0	0	1	0	0	0	0	0	5
05:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
06:00	0	2	0	0	0	0	0	1	0	0	0	0	0	3
07:00	0	0	0	0	0	0	0	0	0	0	1	0	0	1
08:00	0	1	1	0	0	0	0	0	0	0	0	0	0	2
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	1	0	0	0	0	0	0	0	0	0	0	1
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daily Totals	*	25	15	*	1	*	*	3	*	*	4	*	*	48
Totals	0	25	15	0	1	0	0	3	0	0	4	0	0	48
Percent	.0%	52.0%	31.2%	.0%	2.0%	.0%	.0%	6.2%	.0%	.0%	8.3%	.0%	.0%	

DESERT CENTER
EAGLE MOUNTAIN ROAD/
BET RAGSDALE AND I-10 RAMPS
TRUCK CLASSIF/TUESDAY, AUG 1,'95

COUNTS UNLIMITED
909.247.6716

Site Code : 066808
Start Date: 08/01/95
File I.D. : DCEMSRCN
Page : 1

NORTHBOUND

Begin Time	Bikes	Cars & Trlrs	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 08/01	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	1	0	0	0	0	0	0	0	0	0	0	0	1
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	1	0	0	0	0	0	0	0	0	0	0	0	1
01:00 am	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45	0	1	0	0	0	0	0	0	0	0	1	0	0	2
Hour Total	0	1	0	0	0	0	0	0	0	0	1	0	0	2
02:00 am	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 am	0	1	0	0	0	0	0	0	0	0	0	0	0	1
03:15	0	2	0	0	0	0	0	0	0	0	0	0	0	2
03:30	0	1	1	0	1	0	0	0	0	0	0	0	0	3
03:45	0	1	1	0	0	0	0	0	0	0	0	0	0	2
Hour Total	0	5	2	0	1	0	0	0	0	0	0	0	0	8
04:00 am	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 am	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Hour Total	0	0	1	0	0	0	0	0	0	0	0	0	0	1
06:00 am	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0	1	0	0	1
06:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	1	0	0	1
07:00 am	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	1	0	0	1
07:30	0	0	1	0	0	0	0	0	0	0	0	0	0	1
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	1	0	0	0	0	0	0	0	1	0	0	2

DESERT CENTER
EAGLE MOUNTAIN ROAD/
BET RAGSDALE AND I-10 RAMPS
TRUCK CLASSIF/TUESDAY, AUG 1,'95

COUNTS UNLIMITED
909.247.6716

Site Code : 066808
Start Date: 08/01/95
File I.D. : DCEMSRCN

NORTHBOUND

Begin Time	Bikes	Cars & Tlrs	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
08:00 am	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Hour Total	0	1	0	0	0	0	0	0	0	0	0	0	0	1
09:00 am	0	1	0	0	0	0	0	0	0	0	0	0	0	1
09:15	0	0	0	0	0	0	0	1	0	0	0	0	0	1
09:30	0	1	0	0	0	0	0	0	0	0	0	0	0	1
09:45	0	2	1	0	0	0	0	0	0	0	0	0	0	3
Hour Total	0	4	1	0	0	0	0	1	0	0	0	0	0	6
10:00 am	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Hour Total	0	0	1	0	0	0	0	0	0	0	0	0	0	1
11:00 am	0	0	1	0	0	0	0	0	0	0	0	0	0	1
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	1	0	0	0	0	0	0	0	0	0	0	1
12:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	1	0	0	0	0	0	0	0	0	0	0	1
12:45	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Hour Total	0	0	2	0	0	0	0	0	0	0	0	0	0	2
01:00 pm	0	2	1	0	0	0	0	0	0	0	0	0	0	3
01:15	0	1	1	0	0	0	0	0	0	0	0	0	0	2
01:30	0	1	0	0	0	0	0	0	0	0	0	0	0	1
01:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	4	2	0	0	0	0	0	0	0	0	0	0	6
02:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15	0	1	0	0	0	0	0	0	0	0	0	0	0	1
02:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	1	0	0	0	0	0	0	0	0	0	0	0	1
03:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15	0	0	1	0	0	0	0	0	0	0	0	0	0	1
03:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Hour Total	0	0	2	0	0	0	0	0	0	0	0	0	0	2

DESERT CENTER
EAGLE MOUNTAIN ROAD/
BET RAGSDALE AND I-10 RAMPS
TRUCK CLASSIF/TUESDAY, AUG 1,'95

COUNTS UNLIMITED
909.247.6716

NORTHBOUND

Site Code : 066808
Start Date: 08/01/95
File I.D. : DCEMSRCN

Begin Time	Bikes	Cars & Tlrs	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
04:00 pm	0	1	0	0	0	0	0	1	0	0	0	0	0	2
04:15	0	2	0	0	0	0	0	0	0	0	0	0	0	2
04:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Hour Total	0	4	0	0	0	0	0	1	0	0	0	0	0	5
05:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30	0	1	0	0	0	0	0	0	0	0	0	0	0	1
05:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	1	0	0	0	0	0	0	0	0	0	0	0	1
06:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45	0	2	0	0	0	0	0	1	0	0	0	0	0	3
Hour Total	0	2	0	0	0	0	0	1	0	0	0	0	0	3
07:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	1	0	0	1
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	1	0	0	1
08:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	1	0	0	0	0	0	0	0	0	0	0	1
08:30	0	1	0	0	0	0	0	0	0	0	0	0	0	1
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	1	1	0	0	0	0	0	0	0	0	0	0	2
09:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 pm	0	0	1	0	0	0	0	0	0	0	0	0	0	1
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	1	0	0	0	0	0	0	0	0	0	0	1
11:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Day Totals	*	25	15	*	1	*	*	3	*	*	4	*	*	48
Totals	0	25	15	0	1	0	0	3	0	0	4	0	0	48
Percent	.0%	52.0%	31.2%	.0%	2.0%	.0%	.0%	6.2%	.0%	.0%	8.3%	.0%	.0%	

DESERT CENTER
EAGLE MOUNTAIN ROAD/
BET RAGSDALE AND I-10 RAMPS
TRUCK CLASS/TUESDAY, AUG1,'95

COUNTS UNLIMITED
909.247.6716

SOUTHBOUND

Site Code : 066815
Start Date: 08/01/95
File I.D. : DCEMSRCS
Page : 1

Begin Time	Bikes	Cars & Tlrs	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 08/01	0	0	0	0	0	0	0	1	0	0	0	0	0	1
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
07:00	0	4	2	0	0	0	0	0	0	0	0	0	0	6
08:00	0	2	1	0	0	0	0	0	0	0	1	0	0	4
09:00	0	2	2	0	0	0	0	0	0	0	0	0	0	4
10:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
11:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
12:00 pm	0	1	0	0	0	0	0	0	0	0	0	0	0	1
01:00	0	4	4	0	1	0	0	0	0	0	0	0	0	9
02:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	1	0	0	0	0	0	1	0	0	0	0	0	2
05:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
06:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daily Totals	*	21	9	*	1	*	*	2	*	*	1	*	*	34
Totals	0	21	9	0	1	0	0	2	0	0	1	0	0	34
Percent	.0%	61.7%	26.4%	.0%	2.9%	.0%	.0%	5.8%	.0%	.0%	2.9%	.0%	.0%	

DESERT CENTER
EAGLE MOUNTAIN ROAD/
BET RAGSDALE AND I-10 RAMPS
TRUCK CLASS/TUESDAY, AUG1,'95

COUNTS UNLIMITED
909.247.6716

SOUTHBOUND

Site Code : 066815
Start Date: 08/01/95
File I.D. : DCEMSRCS
Page : 1

Begin Time	Bikes	Cars & Tlrs	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 08/01	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Hour Total	0	0	0	0	0	0	0	1	0	0	0	0	0	1
01:00 am	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 am	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 am	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 am	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 am	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:00 am	0	1	0	0	0	0	0	0	0	0	0	0	0	1
06:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	1	0	0	0	0	0	0	0	0	0	0	0	1
07:00 am	0	2	1	0	0	0	0	0	0	0	0	0	0	3
07:15	0	1	0	0	0	0	0	0	0	0	0	0	0	1
07:30	0	1	1	0	0	0	0	0	0	0	0	0	0	2
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	4	2	0	0	0	0	0	0	0	0	0	0	6

DESERT CENTER
EAGLE MOUNTAIN ROAD/
BET RAGSDALE AND I-10 RAMPS
TRUCK CLASS/TUESDAY, AUG1,'95

COUNTS UNLIMITED
909.247.6716

SOUTHBOUND

Site Code : 066815
Start Date: 08/01/95
File I.D. : DCEMSRCS
Page : 2

Begin T	Bikes	Cars & Tlrs	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
08:00 am	0	1	1	0	0	0	0	0	0	0	0	0	0	2
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	1	0	0	1
08:45	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Hour Total	0	2	1	0	0	0	0	0	0	0	1	0	0	4
09:00 am	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	2	0	0	0	0	0	0	0	0	0	0	0	2
09:45	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Hour Total	0	2	2	0	0	0	0	0	0	0	0	0	0	4
10:00 am	0	1	0	0	0	0	0	0	0	0	0	0	0	1
10:15	0	1	0	0	0	0	0	0	0	0	0	0	0	1
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	2	0	0	0	0	0	0	0	0	0	0	0	2
11:00 am	0	1	0	0	0	0	0	0	0	0	0	0	0	1
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	1	0	0	0	0	0	0	0	0	0	0	0	1
12:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	1	0	0	0	0	0	0	0	0	0	0	0	1
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	1	0	0	0	0	0	0	0	0	0	0	0	1
01:00 pm	0	2	0	0	0	0	0	0	0	0	0	0	0	2
01:15	0	1	1	0	1	0	0	0	0	0	0	0	0	3
01:30	0	1	3	0	0	0	0	0	0	0	0	0	0	4
01:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	4	4	0	1	0	0	0	0	0	0	0	0	9
02:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30	0	1	0	0	0	0	0	0	0	0	0	0	0	1
02:45	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Hour Total	0	2	0	0	0	0	0	0	0	0	0	0	0	2
03:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0

DESERT CENTER
EAGLE MOUNTAIN ROAD/
BET RAGSDALE AND I-10 RAMPS
TRUCK CLASS/TUESDAY, AUG1,'95

COUNTS UNLIMITED
909.247.6716

Site Code : 066815
Start Date: 08/01/95
File I.D. : DCEMSRCS

SOUTHBOUND

Begin Time	Bikes	Cars & Tlrs	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
04:00 pm	0	0	0	0	0	0	0	1	0	0	0	0	0	1
04:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Hour Total	0	1	0	0	0	0	0	1	0	0	0	0	0	2
05:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30	0	1	0	0	0	0	0	0	0	0	0	0	0	1
05:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	1	0	0	0	0	0	0	0	0	0	0	0	1
06:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Day Totals	*	21	9	*	1	*	*	2	*	*	1	*	*	34
Totals	0	21	9	0	1	0	0	2	0	0	1	0	0	34
Percent	.0%	61.7%	26.4%	.0%	2.9%	.0%	.0%	5.8%	.0%	.0%	2.9%	.0%	.0%	

DESERT CENTER

DESERT CENTER RICE RD / BET RAGSDALE & I-10 RAMPS

24 HOUR AXLE CLASSIFICATION COUNT
NORTHBOUND/SOUTHBOUND
AUGUST 1995

tel 909.247.6716 fax 909.924.8604

25424 Jaclyn Avenue · Moreno Valley, CA · 92557

DESERT CENTER
DESERT CENTER RICE ROAD/
BET RAGSDALE RD/ I-10 RAMPS
TRUCK CLASSIF/TUESDAY, AUG 1,'95

COUNTS UNLIMITED
909.247.6716

NORTHBOUND

Site Code : 066812
Start Date: 08/01/95
File I.D. : DCDCSRNB
Page : 1

Begin Time	Bikes	Cars & Tlrs	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 08/01	0	9	4	1	1	5	0	0	6	2	6	4	0	38
01:00	0	9	5	0	0	1	0	7	8	4	10	2	1	47
02:00	1	7	2	0	2	1	0	2	8	4	6	1	0	34
03:00	2	11	7	0	2	2	0	3	6	1	4	3	1	42
04:00	1	9	2	0	2	0	0	0	2	0	4	3	0	23
05:00	0	6	6	0	2	0	1	2	5	1	2	1	2	28
06:00	0	15	4	0	2	0	0	5	7	0	2	0	0	35
07:00	0	21	15	0	2	1	0	3	6	1	2	1	0	52
08:00	0	19	11	1	0	1	0	4	13	3	2	0	0	54
09:00	0	30	11	1	2	1	0	1	8	0	0	1	0	55
10:00	1	31	9	2	3	1	0	2	5	0	1	1	0	56
11:00	0	33	22	0	4	1	0	1	7	0	0	0	0	68
12:00 pm	0	29	13	3	2	0	0	3	5	2	0	1	0	58
01:00	0	33	28	1	3	0	0	1	8	2	0	0	0	76
02:00	1	37	17	2	1	0	0	1	11	0	0	0	0	70
03:00	0	32	12	0	4	1	1	3	2	0	2	0	0	57
04:00	0	30	12	1	2	0	0	6	4	1	1	0	0	57
05:00	0	25	11	0	2	0	0	8	4	0	1	1	0	52
06:00	1	21	13	0	1	0	1	1	3	0	0	0	1	42
07:00	2	21	11	3	2	0	0	1	6	0	3	0	0	49
08:00	1	22	11	0	2	2	1	1	2	1	0	0	0	43
09:00	3	24	6	2	3	4	0	0	13	2	0	0	0	57
10:00	0	23	7	2	2	0	0	3	18	1	0	0	0	56
11:00	1	20	7	1	4	2	1	2	12	4	0	0	0	54
Daily Totals	14	517	246	20	50	23	5	60	169	29	46	19	5	1203
Totals	14	517	246	20	50	23	5	60	169	29	46	19	5	1203
Percent	1.1%	42.9%	20.4%	1.6%	4.1%	1.9%	.4%	4.9%	14.0%	2.4%	3.8%	1.5%	.4%	

29.3%

DESERT CENTER
DESERT CENTER RICE ROAD/
BET RAGSDALE RD/ I-10 RAMPS
TRUCK CLASSIF/TUESDAY, AUG 1,'95

COUNTS UNLIMITED
909.247.6716

Site Code : 066812
Start Date: 08/01/95
File I.D. : DCDCSRNB

NORTHBOUND

Begin Time	Bikes	Cars & Tlrs	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 08/01	0	3	2	0	0	1	0	0	0	0	0	0	0	6
12:15	0	3	1	0	0	1	0	0	0	2	2	1	0	10
12:30	0	2	1	0	0	2	0	0	3	0	3	1	0	12
12:45	0	1	0	1	1	1	0	0	3	0	1	2	0	10
Hour Total	0	9	4	1	1	5	0	0	6	2	6	4	0	38
01:00 am	0	2	3	0	0	0	0	2	3	2	1	0	0	13
01:15	0	1	1	0	0	0	0	1	4	0	3	1	0	11
01:30	0	3	1	0	0	1	0	3	1	2	2	1	1	15
01:45	0	3	0	0	0	0	0	1	0	0	4	0	0	8
Hour Total	0	9	5	0	0	1	0	7	8	4	10	2	1	47
02:00 am	1	1	1	0	0	1	0	1	1	0	3	0	0	9
02:15	0	2	1	0	0	0	0	0	3	3	2	0	0	11
02:30	0	1	0	0	1	0	0	1	3	0	1	0	0	7
02:45	0	3	0	0	1	0	0	0	1	1	0	1	0	7
Hour Total	1	7	2	0	2	1	0	2	8	4	6	1	0	34
03:00 am	1	5	2	0	0	0	0	1	4	0	1	1	0	15
03:15	1	2	2	0	1	1	0	0	1	1	2	1	1	13
03:30	0	3	0	0	0	0	0	1	1	0	1	0	0	6
03:45	0	1	3	0	1	1	0	1	0	0	0	1	0	8
Hour Total	2	11	7	0	2	2	0	3	6	1	4	3	1	42
04:00 am	1	2	1	0	0	0	0	0	1	0	2	2	0	9
04:15	0	4	0	0	2	0	0	0	0	0	0	0	0	6
04:30	0	2	0	0	0	0	0	0	0	0	1	0	0	3
04:45	0	1	1	0	0	0	0	0	1	0	1	1	0	5
Hour Total	1	9	2	0	2	0	0	0	2	0	4	3	0	23
05:00 am	0	1	1	0	0	0	0	0	0	1	0	0	1	4
05:15	0	3	3	0	1	0	0	0	3	0	1	1	0	12
05:30	0	1	0	0	0	0	0	2	2	0	1	0	1	7
05:45	0	1	2	0	1	0	1	0	0	0	0	0	0	5
Hour Total	0	6	6	0	2	0	1	2	5	1	2	1	2	28
06:00 am	0	2	0	0	2	0	0	1	2	0	1	0	0	8
06:15	0	0	2	0	0	0	0	1	1	0	0	0	0	4
06:30	0	6	1	0	0	0	0	0	1	0	0	0	0	8
06:45	0	7	1	0	0	0	0	3	3	0	1	0	0	15
Hour Total	0	15	4	0	2	0	0	5	7	0	2	0	0	35
07:00 am	0	8	2	0	0	0	0	0	1	0	1	0	0	12
07:15	0	2	5	0	0	0	0	1	1	0	0	1	0	10
07:30	0	6	2	0	0	0	0	0	2	1	0	0	0	11
07:45	0	5	6	0	2	1	0	2	2	0	1	0	0	19
Hour Total	0	21	15	0	2	1	0	3	6	1	2	1	0	52

DESERT CENTER
DESERT CENTER RICE ROAD/
BET RAGSDALE RD/ I-10 RAMPS
TRUCK CLASSIF/TUESDAY, AUG 1,'95

COUNTS UNLIMITED
909.247.6716

Site Code : 066812
Start Date: 08/01/95
File I.D. : DCDCSRNB

NORTHBOUND

Begin Time	Bikes	Cars & Tlrs	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
08:00 am	0	0	5	0	0	0	0	1	5	0	1	0	0	12
08:15	0	7	2	0	0	0	0	1	3	2	1	0	0	16
08:30	0	4	1	0	0	0	0	1	3	0	0	0	0	9
08:45	0	8	3	1	0	1	0	1	2	1	0	0	0	17
Hour Total	0	19	11	1	0	1	0	4	13	3	2	0	0	54
09:00 am	0	10	3	0	0	0	0	0	2	0	0	0	0	15
09:15	0	3	1	0	0	1	0	1	3	0	0	1	0	10
09:30	0	9	3	1	2	0	0	0	2	0	0	0	0	17
09:45	0	8	4	0	0	0	0	0	1	0	0	0	0	13
Hour Total	0	30	11	1	2	1	0	1	8	0	0	1	0	55
10:00 am	1	5	1	0	0	0	0	1	1	0	1	0	0	10
10:15	0	11	4	0	1	1	0	1	1	0	0	1	0	20
10:30	0	5	2	1	0	0	0	0	3	0	0	0	0	11
10:45	0	10	2	1	2	0	0	0	0	0	0	0	0	15
Hour Total	1	31	9	2	3	1	0	2	5	0	1	1	0	56
11:00 am	0	9	6	0	1	0	0	1	0	0	0	0	0	17
11:15	0	9	2	0	2	0	0	0	3	0	0	0	0	16
11:30	0	8	13	0	1	0	0	0	4	0	0	0	0	26
11:45	0	7	1	0	0	1	0	0	0	0	0	0	0	9
Hour Total	0	33	22	0	4	1	0	1	7	0	0	0	0	68
12:00 pm	0	6	4	1	1	0	0	0	1	0	0	0	0	13
12:15	0	4	4	2	0	0	0	0	3	0	0	1	0	14
12:30	0	7	3	0	0	0	0	0	0	1	0	0	0	11
12:45	0	12	2	0	1	0	0	3	1	1	0	0	0	20
Hour Total	0	29	13	3	2	0	0	3	5	2	0	1	0	58
01:00 pm	0	10	12	0	0	0	0	0	1	0	0	0	0	23
01:15	0	9	7	0	0	0	0	0	1	1	0	0	0	18
01:30	0	9	7	1	1	0	0	0	4	0	0	0	0	22
01:45	0	5	2	0	2	0	0	1	2	1	0	0	0	13
Hour Total	0	33	28	1	3	0	0	1	8	2	0	0	0	76
02:00 pm	0	12	8	1	0	0	0	0	1	0	0	0	0	22
02:15	0	7	4	0	1	0	0	1	2	0	0	0	0	15
02:30	0	8	3	1	0	0	0	0	4	0	0	0	0	16
02:45	1	10	2	0	0	0	0	0	4	0	0	0	0	17
Hour Total	1	37	17	2	1	0	0	1	11	0	0	0	0	70
03:00 pm	0	8	3	0	1	0	0	1	0	0	1	0	0	14
03:15	0	13	4	0	0	0	1	1	1	0	0	0	0	20
03:30	0	2	3	0	1	1	0	1	1	0	1	0	0	10
03:45	0	9	2	0	2	0	0	0	0	0	0	0	0	13
Hour Total	0	32	12	0	4	1	1	3	2	0	2	0	0	57

DESERT CENTER
DESERT CENTER RICE ROAD/
BET RAGSDALE RD/ I-10 RAMPS
TRUCK CLASSIF/TUESDAY, AUG 1,'95

COUNTS UNLIMITED
909.247.6716

Site Code : 066812
Start Date: 08/01/95
File I.D. : DCDCSRNB

NORTHBOUND

Begin Time	Bikes	Cars & Tlrs	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
04:00 pm	0	9	3	0	0	0	0	2	1	0	0	0	0	15
04:15	0	11	5	0	2	0	0	0	2	0	1	0	0	21
04:30	0	5	1	0	0	0	0	1	1	0	0	0	0	8
04:45	0	5	3	1	0	0	0	3	0	1	0	0	0	13
Hour Total	0	30	12	1	2	0	0	6	4	1	1	0	0	57
05:00 pm	0	6	3	0	0	0	0	1	2	0	0	0	0	12
05:15	0	5	2	0	0	0	0	4	0	0	0	0	0	11
05:30	0	8	3	0	1	0	0	1	1	0	1	0	0	15
05:45	0	6	3	0	1	0	0	2	1	0	0	1	0	14
Hour Total	0	25	11	0	2	0	0	8	4	0	1	1	0	52
06:00 pm	0	4	6	0	0	0	0	1	3	0	0	0	0	14
06:15	1	4	3	0	0	0	1	0	0	0	0	0	1	10
06:30	0	5	0	0	1	0	0	0	0	0	0	0	0	6
06:45	0	8	4	0	0	0	0	0	0	0	0	0	0	12
Hour Total	1	21	13	0	1	0	1	1	3	0	0	0	1	42
07:00 pm	0	4	1	1	0	0	0	0	2	0	1	0	0	9
07:15	0	4	2	0	0	0	0	1	0	0	1	0	0	8
07:30	2	7	5	1	0	0	0	0	2	0	1	0	0	18
07:45	0	6	3	1	2	0	0	0	2	0	0	0	0	14
Hour Total	2	21	11	3	2	0	0	1	6	0	3	0	0	49
08:00 pm	0	7	2	0	0	0	0	0	0	0	0	0	0	9
08:15	0	3	4	0	2	0	0	0	1	1	0	0	0	11
08:30	0	8	3	0	0	1	1	1	1	0	0	0	0	15
08:45	1	4	2	0	0	1	0	0	0	0	0	0	0	8
Hour Total	1	22	11	0	2	2	1	1	2	1	0	0	0	43
09:00 pm	1	5	4	1	1	1	0	0	7	0	0	0	0	20
09:15	1	7	1	0	1	2	0	0	4	1	0	0	0	17
09:30	1	6	1	0	0	1	0	0	1	1	0	0	0	11
09:45	0	6	0	1	1	0	0	0	1	0	0	0	0	9
Hour Total	3	24	6	2	3	4	0	0	13	2	0	0	0	57
10:00 pm	0	5	1	0	0	0	0	0	10	0	0	0	0	16
10:15	0	6	3	0	0	0	0	1	4	0	0	0	0	14
10:30	0	4	1	1	1	0	0	0	3	1	0	0	0	11
10:45	0	8	2	1	1	0	0	2	1	0	0	0	0	15
Hour Total	0	23	7	2	2	0	0	3	18	1	0	0	0	56
11:00 pm	1	3	2	0	0	1	0	0	5	0	0	0	0	12
11:15	0	4	2	0	1	0	0	2	4	2	0	0	0	15
11:30	0	4	2	0	1	1	0	0	3	0	0	0	0	11
11:45	0	9	1	1	2	0	1	0	0	2	0	0	0	16
Hour Total	1	20	7	1	4	2	1	2	12	4	0	0	0	54
Day Totals	14	517	246	20	50	23	5	60	169	29	46	19	5	1203
Totals	14	517	246	20	50	23	5	60	169	29	46	19	5	1203
Percent	1.1%	42.9%	20.4%	1.6%	4.1%	1.9%	.4%	4.9%	14.0%	2.4%	3.8%	1.5%	.4%	

DESERT CENTER
DESERT CENTER RICE ROAD/
BET RAGSDALE RD/I-10 RAMPS
TRUCK CLASSIF/TUESDAY, AUG 1,'95

COUNTS UNLIMITED
909.247.6716

Site Code : 066807
Start Date: 08/01/95
File I.D. : DCDCSRCS

SOUTHBOUND

Begin Time	Bikes	Cars & Tlrs	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 08/01	2	10	4	0	0	0	0	2	15	0	6	0	0	39
01:00	0	7	2	0	1	0	0	5	16	0	14	4	0	49
02:00	0	7	4	0	3	0	0	4	9	0	14	1	0	42
03:00	0	8	5	0	2	0	0	3	10	1	12	4	0	45
04:00	2	11	2	0	1	0	0	0	9	1	12	1	0	39
05:00	0	22	8	0	1	0	0	0	16	0	13	1	0	61
06:00	0	14	5	0	2	0	0	1	4	0	6	1	0	33
07:00	0	18	11	0	2	0	0	0	15	0	4	0	0	50
08:00	0	24	14	0	2	1	0	2	9	0	2	0	0	54
09:00	0	29	7	0	2	1	0	1	12	0	5	0	0	57
10:00	0	36	11	0	4	1	1	3	11	0	1	1	0	69
11:00	1	47	16	1	6	1	0	3	7	0	3	0	0	85
12:00 pm	0	40	15	2	1	1	0	1	3	0	8	0	0	71
01:00	0	51	23	3	3	1	0	2	8	0	2	0	0	93
02:00	3	31	15	1	2	0	0	5	8	0	0	2	0	67
03:00	0	45	8	0	0	1	0	3	10	0	1	1	0	69
04:00	0	35	15	2	1	0	2	0	6	0	1	0	0	62
05:00	0	34	6	0	4	0	0	0	7	0	2	0	0	53
06:00	1	20	7	0	2	0	0	3	5	0	1	0	0	39
07:00	1	20	12	0	2	0	0	3	5	0	2	1	0	46
08:00	0	28	16	2	3	1	0	3	7	0	5	1	0	66
09:00	0	24	5	1	0	0	0	3	9	0	4	0	0	46
10:00	1	15	6	2	1	1	0	1	12	0	0	0	0	39
11:00	1	14	3	1	2	0	1	1	14	0	0	0	0	37
Day Totals	12	590	220	15	47	9	4	49	227	2	118	18	*	1311
Totals	12	590	220	15	47	9	4	49	227	2	118	18	0	1311
Percent	.9%	45.0%	16.7%	1.1%	3.5%	.6%	.3%	3.7%	17.3%	.1%	9.0%	1.3%	.0%	

DESERT CENTER
DESERT CENTER RICE ROAD/
BET RAGSDALE RD/I-10 RAMPS
TRUCK CLASSIF/TUESDAY, AUG 1,'95

COUNTS UNLIMITED
909.247.6716

Site Code : 066807
Start Date: 08/01/95
File I.D. : DCDCSRCS

SOUTHBOUND

Begin Time	Bikes	Cars & Tlrs	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 08/01	0	3	1	0	0	0	0	0	4	0	1	0	0	9
12:15	1	3	1	0	0	0	0	2	2	0	0	0	0	9
12:30	1	4	0	0	0	0	0	0	2	0	2	0	0	9
12:45	0	0	2	0	0	0	0	0	7	0	3	0	0	12
Hour Total	2	10	4	0	0	0	0	2	15	0	6	0	0	39
01:00 am	0	2	0	0	1	0	0	1	6	0	4	1	0	15
01:15	0	1	0	0	0	0	0	1	5	0	3	0	0	10
01:30	0	1	2	0	0	0	0	2	3	0	3	0	0	11
01:45	0	3	0	0	0	0	0	1	2	0	4	3	0	13
Hour Total	0	7	2	0	1	0	0	5	16	0	14	4	0	49
02:00 am	0	0	1	0	2	0	0	2	1	0	2	0	0	8
02:15	0	3	1	0	0	0	0	1	5	0	3	0	0	13
02:30	0	3	1	0	1	0	0	1	3	0	9	1	0	19
02:45	0	1	1	0	0	0	0	0	0	0	0	0	0	2
Hour Total	0	7	4	0	3	0	0	4	9	0	14	1	0	42
03:00 am	0	1	0	0	1	0	0	0	3	0	4	2	0	11
03:15	0	5	2	0	0	0	0	1	4	0	1	0	0	13
03:30	0	0	1	0	0	0	0	1	0	0	3	2	0	7
03:45	0	2	2	0	1	0	0	1	3	1	4	0	0	14
Hour Total	0	8	5	0	2	0	0	3	10	1	12	4	0	45
04:00 am	0	4	1	0	0	0	0	0	2	1	6	0	0	14
04:15	1	1	1	0	0	0	0	0	3	0	5	1	0	12
04:30	0	2	0	0	1	0	0	0	4	0	0	0	0	7
04:45	1	4	0	0	0	0	0	0	0	0	1	0	0	6
Hour Total	2	11	2	0	1	0	0	0	9	1	12	1	0	39
05:00 am	0	10	2	0	0	0	0	0	1	0	3	0	0	16
05:15	0	3	1	0	0	0	0	0	5	0	1	1	0	11
05:30	0	7	3	0	0	0	0	0	6	0	8	0	0	24
05:45	0	2	2	0	1	0	0	0	4	0	1	0	0	10
Hour Total	0	22	8	0	1	0	0	0	16	0	13	1	0	61
06:00 am	0	3	0	0	0	0	0	0	1	0	4	0	0	8
06:15	0	3	2	0	1	0	0	0	3	0	1	1	0	11
06:30	0	3	0	0	1	0	0	0	0	0	0	0	0	4
06:45	0	5	3	0	0	0	0	1	0	0	1	0	0	10
Hour Total	0	14	5	0	2	0	0	1	4	0	6	1	0	33
07:00 am	0	8	3	0	1	0	0	0	5	0	0	0	0	17
07:15	0	6	4	0	1	0	0	0	4	0	3	0	0	18
07:30	0	3	2	0	0	0	0	0	2	0	1	0	0	8
07:45	0	1	2	0	0	0	0	0	4	0	0	0	0	7
Hour Total	0	18	11	0	2	0	0	0	15	0	4	0	0	50

DESERT CENTER
DESERT CENTER RICE ROAD/
BET RAGSDALE RD/I-10 RAMPS
TRUCK CLASSIF/TUESDAY, AUG 1,'95

COUNTS UNLIMITED
909.247.6716

Site Code : 066807
Start Date: 08/01/95
File I.D. : DCDCSRCS
Page : 2

SOUTHBOUND

Begin Ti	Bikes	Cars & Tlrs	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
08:[illegible] am	0	8	3	0	0	0	0	0	1	0	0	0	0	12
08:15	0	6	5	0	0	0	0	0	3	0	0	0	0	14
08:30	0	4	3	0	1	1	0	1	3	0	0	0	0	13
08:45	0	6	3	0	1	0	0	1	2	0	2	0	0	15
Hour Total	0	24	14	0	2	1	0	2	9	0	2	0	0	54
09:00 am	0	5	0	0	1	0	0	1	2	0	4	0	0	13
09:15	0	7	3	0	0	1	0	0	6	0	0	0	0	17
09:30	0	12	3	0	0	0	0	0	0	0	1	0	0	16
09:45	0	5	1	0	1	0	0	0	4	0	0	0	0	11
Hour Total	0	29	7	0	2	1	0	1	12	0	5	0	0	57
10:00 am	0	11	4	0	1	1	0	2	4	0	1	1	0	25
10:15	0	11	2	0	0	0	0	1	3	0	0	0	0	17
10:30	0	6	4	0	2	0	0	0	3	0	0	0	0	15
10:45	0	8	1	0	1	0	1	0	1	0	0	0	0	12
Hour Total	0	36	11	0	4	1	1	3	11	0	1	1	0	69
11:00 am	1	15	4	1	2	0	0	1	0	0	1	0	0	25
11:15	0	10	5	0	1	0	0	0	2	0	1	0	0	19
11:30	0	9	4	0	1	1	0	1	2	0	1	0	0	19
11:45	0	13	3	0	2	0	0	1	3	0	0	0	0	22
Hour Total	1	47	16	1	6	1	0	3	7	0	3	0	0	85
12:00 pm	0	14	3	1	1	0	0	0	0	0	0	0	0	19
12:[illegible]	0	6	5	0	0	0	0	0	1	0	1	0	0	13
12:[illegible]	0	7	4	1	0	1	0	0	1	0	7	0	0	21
12:45	0	13	3	0	0	0	0	1	1	0	0	0	0	18
Hour Total	0	40	15	2	1	1	0	1	3	0	8	0	0	71
01:00 pm	0	15	4	1	1	0	0	0	2	0	0	0	0	23
01:15	0	15	6	1	1	0	0	0	4	0	1	0	0	28
01:30	0	13	7	0	1	0	0	1	0	0	0	0	0	22
01:45	0	8	6	1	0	1	0	1	2	0	1	0	0	20
Hour Total	0	51	23	3	3	1	0	2	8	0	2	0	0	93
02:00 pm	0	10	5	0	1	0	0	1	2	0	0	1	0	20
02:15	1	7	2	0	0	0	0	3	1	0	0	0	0	14
02:30	0	8	4	1	1	0	0	1	4	0	0	0	0	19
02:45	2	6	4	0	0	0	0	0	1	0	0	1	0	14
Hour Total	3	31	15	1	2	0	0	5	8	0	0	2	0	67
03:00 pm	0	12	1	0	0	0	0	1	5	0	0	0	0	19
03:15	0	16	3	0	0	0	0	0	1	0	0	0	0	20
03:30	0	8	2	0	0	0	0	0	2	0	0	0	0	12
03:45	0	9	2	0	0	1	0	2	2	0	1	1	0	18
Hour Total	0	45	8	0	0	1	0	3	10	0	1	1	0	69

DESERT CENTER

DESERT CENTER RICE ROAD/
BET RAGSDALE RD/I-10 RAMPS
TRUCK CLASSIF/TUESDAY, AUG 1,'95

COUNTS UNLIMITED
909.247.6716

Site Code : 066807
Start Date: 08/01/95
File I.D. : DCDCSRCS
Page : 3

SOUTHBOUND

Begin Time	Bikes	Cars & Tlrs	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
04:00 pm	0	10	4	0	0	0	0	0	1	0	0	0	0	15
04:15	0	8	2	0	0	0	1	0	2	0	0	0	0	13
04:30	0	10	5	1	1	0	0	0	2	0	0	0	0	19
04:45	0	7	4	1	0	0	1	0	1	0	1	0	0	15
Hour Total	0	35	15	2	1	0	2	0	6	0	1	0	0	62
05:00 pm	0	11	1	0	1	0	0	0	2	0	1	0	0	16
05:15	0	8	2	0	1	0	0	0	1	0	0	0	0	12
05:30	0	7	0	0	1	0	0	0	3	0	1	0	0	12
05:45	0	8	3	0	1	0	0	0	1	0	0	0	0	13
Hour Total	0	34	6	0	4	0	0	0	7	0	2	0	0	53
06:00 pm	0	6	2	0	0	0	0	0	1	0	0	0	0	9
06:15	1	4	2	0	0	0	0	2	3	0	1	0	0	13
06:30	0	5	2	0	1	0	0	1	0	0	0	0	0	9
06:45	0	5	1	0	1	0	0	0	1	0	0	0	0	8
Hour Total	1	20	7	0	2	0	0	3	5	0	1	0	0	39
07:00 pm	0	5	4	0	1	0	0	0	1	0	0	0	0	11
07:15	0	5	2	0	1	0	0	3	0	0	0	0	0	11
07:30	0	6	3	0	0	0	0	0	3	0	0	0	0	12
07:45	1	4	3	0	0	0	0	0	1	0	2	1	0	12
Hour Total	1	20	12	0	2	0	0	3	5	0	2	1	0	46
08:00 pm	0	7	6	0	0	0	0	3	3	0	2	0	0	21
08:15	0	5	2	1	1	0	0	0	0	0	1	0	0	10
08:30	0	5	6	1	2	1	0	0	3	0	2	1	0	21
08:45	0	11	2	0	0	0	0	0	1	0	0	0	0	14
Hour Total	0	28	16	2	3	1	0	3	7	0	5	1	0	66
09:00 pm	0	5	1	0	0	0	0	1	0	0	1	0	0	8
09:15	0	4	2	1	0	0	0	0	5	0	2	0	0	14
09:30	0	7	1	0	0	0	0	1	1	0	1	0	0	11
09:45	0	8	1	0	0	0	0	1	3	0	0	0	0	13
Hour Total	0	24	5	1	0	0	0	3	9	0	4	0	0	46
10:00 pm	0	5	0	0	1	0	0	0	0	0	0	0	0	6
10:15	0	8	1	0	0	0	0	0	1	0	0	0	0	10
10:30	0	0	2	0	0	0	0	0	7	0	0	0	0	9
10:45	1	2	3	2	0	1	0	1	4	0	0	0	0	14
Hour Total	1	15	6	2	1	1	0	1	12	0	0	0	0	39
11:00 pm	0	1	2	1	0	0	0	0	0	0	0	0	0	4
11:15	0	2	0	0	0	0	0	1	2	0	0	0	0	5
11:30	0	8	1	0	0	0	0	0	7	0	0	0	0	16
11:45	1	3	0	0	2	0	1	0	5	0	0	0	0	12
Hour Total	1	14	3	1	2	0	1	1	14	0	0	0	0	37
Day Totals	12	590	220	15	47	9	4	49	227	2	118	18	*	1311
Totals	12	590	220	15	47	9	4	49	227	2	118	18	0	1311
Percent	.9%	45.0%	16.7%	1.1%	3.5%	.6%	.3%	3.7%	17.3%	.1%	9.0%	1.3%	.0%	

APPENDIX C
Existing Traffic Operating Conditions Level of Service Analysis Worksheets

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... EAGLE MTN RD N/O RAGSDALE RD
ANALYST..... MAS
TIME OF ANALYSIS..... 1995 EXISTING
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 95EXEMRR.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	12.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	4
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	50 / 50
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	4
PERCENT NO PASSING ZONES.....	20

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	.92	1	.85
B	2.2	2	2.5	.92	1	.83
C	2.2	2	2.5	.92	1	.83
D	2	1.6	1.6	.92	1	.87
E	2	1.6	1.6	.97	1	.87

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 6
ACTUAL FLOW RATE: 6

LOS	SERVICE FLOW RATE	V/C
A	264	.12
B	512	.24
C	833	.39
D	1394	.62
E	2370	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... KAISER RD N/O DESERT CTR RICE RD
ANALYST..... MAS
TIME OF ANALYSIS..... 1995 EXISTING
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 95EXKRDC.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	31.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	4
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	43 / 57
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	4
PERCENT NO PASSING ZONES.....	20

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	.92	.96	.74
B	2.2	2	2.5	.92	.96	.7
C	2.2	2	2.5	.92	.96	.7
D	2	1.6	1.6	.92	.96	.75
E	2	1.6	1.6	.97	.96	.75

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 41
ACTUAL FLOW RATE: 41

LOS	SERVICE FLOW RATE	V/C
A	218	.12
B	413	.24
C	671	.39
D	1145	.62
E	1948	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... KAISER RD N/O LAKE TAMARISK DR
ANALYST..... MAS
TIME OF ANALYSIS..... 1995 EXISTING
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 95EXKRLT.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	31.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	4
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	40 / 60
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	4
PERCENT NO PASSING ZONES.....	20

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	.92	.96	.74
B	2.2	2	2.5	.92	.96	.7
C	2.2	2	2.5	.92	.96	.7
D	2	1.6	1.6	.92	.96	.75
E	2	1.6	1.6	.97	.96	.75

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 26
ACTUAL FLOW RATE: 26

LOS	SERVICE FLOW RATE	V/C
A	218	.12
B	414	.24
C	672	.39
D	1148	.62
E	1952	1

LOS FOR GIVEN CONDITIONS: A

****

File Name L1EXAM.HCO
Streets: (N-S) EAGLE MOUNTAIN RD (E-W) I-10 EB RAMP
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MAS
Date of Analysis..... 8/9/95
Other Information..... 1995 AM PEAK HOUR
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	0	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	0	0	0		1	3	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		0
Potential Capacity: (pcph)		1385
Movement Capacity: (pcph)		1385
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		0
Potential Capacity: (pcph)		1091
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1091
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		0
Potential Capacity: (pcph)		1059
Major LT, Minor TH Impedance Factor:		1.00
Adjusted Impedance Factor:		1.00
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1059

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	1	1059	1083	3.3	A	
EB T	3	1091				3.3

Intersection Delay = 3.3

****

File Name L1EXPM.HCO
Streets: (N-S) EAGLE MOUNTAIN RD (E-W) I-10 EB RAMP
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MAS
Date of Analysis..... 8/9/95
Other Information..... 1995 PM PEAK HOUR
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	0	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	2	0	0		5	2	2			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		0
Potential Capacity: (pcph)		1385
Movement Capacity: (pcph)		1385
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	2	
Potential Capacity: (pcph)	1711	
Movement Capacity: (pcph)	1711	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		2
Potential Capacity: (pcph)		1088
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1088
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		1
Potential Capacity: (pcph)		1057
Major LT, Minor TH Impedance Factor:		1.00
Adjusted Impedance Factor:		1.00
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1057

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	6	1057	1065	3.4	A	
EB T	2	1088				3.2
EB R	2	1385		2.6	A	

Intersection Delay = 2.7

****

File Name L2EXAM.HCO
Streets: (N-S) EAGLE MOUNTAIN RD (E-W) I-10 WB RAMP
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MAS
Date of Analysis..... 8/9/95
Other Information..... 1995 AM PEAK HOUR
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1	1
Stop/Yield			N			N						
Volumes	0	1			0	6				0	0	1
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	1	
Potential Capacity: (pcph)	1383	
Movement Capacity: (pcph)	1383	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		6
Potential Capacity: (pcph)		1703
Movement Capacity: (pcph)		1703
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	7	
Potential Capacity: (pcph)	1082	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1082	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	1	
Potential Capacity: (pcph)	1057	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1057	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB R	1	1383		2.6	A	

Intersection Delay = 0.3

****

File Name L2EXPM.HCO
Streets: (N-S) EAGLE MOUNTAIN RD (E-W) I-10 WB RAMP
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MAS
Date of Analysis..... 8/9/95
Other Information..... 1995 PM PEAK HOUR
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1	1
Stop/Yield			N			N						
Volumes	1	5			1	0				0	2	0
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	5	
Potential Capacity: (pcph)	1377	
Movement Capacity: (pcph)	1377	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		1
Potential Capacity: (pcph)		1712
Movement Capacity: (pcph)		1712
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	7	
Potential Capacity: (pcph)	1082	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1081	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	7	
Potential Capacity: (pcph)	1049	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1048	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB T	2	1081		3.3	A	3.3
				3.3		
NB L	1	1712		2.1	A	0.4

Intersection Delay = 1.0

****

File Name L3EXAM.HCO
Streets: (N-S) EAGLE MOUNTAIN RD (E-W) RAGSDALE ROAD
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MAS
Date of Analysis..... 8/9/95
Other Information..... 1995 AM PEAK HOUR
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	0	0	0	1>	0<	1
Stop/Yield			N			N						
Volumes		1	1	0	0					5		1
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0			0			0	
MC's (%)		0	0	0	0					0		0
SU/RV's (%)		0	0	0	0					0		0
CV's (%)		0	0	0	0					0		0
PCE's		1.1	1.1	1.1	1.1					1.1		1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

****

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	1	
Potential Capacity: (pcph)	1383	
Movement Capacity: (pcph)	1383	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	2	
Potential Capacity: (pcph)	1711	
Movement Capacity: (pcph)	1711	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	2	
Potential Capacity: (pcph)	1056	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1056	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB L	6	1056	1093	3.3	A	3.3
WB R	1	1383				

Intersection Delay = 2.4

****

File Name L3EXPM.HCO
Streets: (N-S) EAGLE MOUNTAIN RD (E-W) RAGSDALE ROAD
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MAS
Date of Analysis..... 8/9/95
Other Information..... 1995 PM PEAK HOUR
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	0	0	0	1>	0<	1
Stop/Yield			N			N						
Volumes		2	2	1	0					1		0
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0			0			0	
MC's (%)		0	0	0	0					0		0
SU/RV's (%)		0	0	0	0					0		0
CV's (%)		0	0	0	0					0		0
PCE's		1.1	1.1	1.1	1.1					1.1		1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	2	
Potential Capacity: (pcph)	1381	
Movement Capacity: (pcph)	1381	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	4	
Potential Capacity: (pcph)	1707	
Movement Capacity: (pcph)	1707	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	3	
Potential Capacity: (pcph)	1055	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1054	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB L	1	1054	1054	3.4	A	
SB L	1	1707		2.1	A	2.1

Intersection Delay = 1.1

****

File Name L4EXAM.HCO
Streets: (N-S) DESERT CTR RICE RD (E-W) I-10 EB RAMP
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MAS
Date of Analysis..... 8/9/95
Other Information..... 1995 AM PEAK HOUR
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	0	16	1		43	1	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		1
Potential Capacity: (pcph)		1383
Movement Capacity: (pcph)		1383
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-free State:	0.99	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		17
Potential Capacity: (pcph)		1069
Capacity Adjustment Factor due to Impeding Movements		0.99
Movement Capacity: (pcph)		1057
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		17
Potential Capacity: (pcph)		1035
Major LT, Minor TH Impedance Factor:		0.99
Adjusted Impedance Factor:		0.99
Capacity Adjustment Factor due to Impeding Movements		0.99
Movement Capacity: (pcph)		1024

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	50	1024	1025	3.7	A	
EB T	1	1057				3.7
SB L	19	1714		2.1	A	2.0

Intersection Delay = 3.2

****

File Name L4EXPM.HCO
Streets: (N-S) DESERT CTR RICE RD (E-W) I-10 EB RAMP
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MAS
Date of Analysis..... 8/9/95
Other Information..... 1995 PM PEAK HOUR
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		1	0	13	1		36	1	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

****

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		1
Potential Capacity: (pcph)		1383
Movement Capacity: (pcph)		1383
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	1	
Potential Capacity: (pcph)	1712	
Movement Capacity: (pcph)	1712	
Prob. of Queue-free State:	0.99	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		15
Potential Capacity: (pcph)		1071
Capacity Adjustment Factor due to Impeding Movements		0.99
Movement Capacity: (pcph)		1062
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		15
Potential Capacity: (pcph)		1038
Major LT, Minor TH Impedance Factor:		0.99
Adjusted Impedance Factor:		0.99
Capacity Adjustment Factor due to Impeding Movements		0.99
Movement Capacity: (pcph)		1029

****

Intersection Performance Summary

Movement		FlowRate v(pcph)	MoveCap Cm(pcph)		SharedCap Csh(pcph)	Avg.Total Delay		LOS		Delay By App
EB	L	42	1029	>	1030	>	3.6	>	A	
EB	T	1	1062	>		>		>		3.6
SB	L	15	1712			2.1		A		2.0

Intersection Delay = 3.1

****

File Name L5EXAM.HCO
Streets: (N-S) DESERT CTR RICE RD (E-W) I-10 WB RAMP
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MAS
Date of Analysis..... 8/9/95
Other Information..... 1995 AM PEAK HOUR
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	1>	1<	1	0	0	0
Stop/Yield			N			N						
Volumes	0	37			14	40	1	1	13			
PHF	.95	.95			.95	.95	.95	.95	.95			
Grade		0			0			0			0	
MC's (%)	0	0			0	0	0	0	0			
SU/RV's (%)	0	0			0	0	0	0	0			
CV's (%)	0	0			0	0	0	0	0			
PCE's	1.1	1.1			1.1	1.1	1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

****

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		14
Potential Capacity: (pcph)		1362
Movement Capacity: (pcph)		1362
Prob. of Queue-free State:		0.99
Step 2: LT from Major Street	**SB**	**NB**
Conflicting Flows: (vph)		54
Potential Capacity: (pcph)		1616
Movement Capacity: (pcph)		1616
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00
Step 3: TH from Minor Street	**WB**	**EB**
Conflicting Flows: (vph)		51
Potential Capacity: (pcph)		1026
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1026
Prob. of Queue-free State:		1.00
Step 4: LT from Minor Street	**WB**	**EB**
Conflicting Flows: (vph)		71
Potential Capacity: (pcph)		963
Major LT, Minor TH Impedance Factor:		1.00
Adjusted Impedance Factor:		1.00
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		963

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	1	963				
EB T	1	1026	1305	2.8	A	2.8
EB R	15	1362				

Intersection Delay = 0.6

****

File Name L5EXPM.HCO
Streets: (N-S) DESERT CTR RICE RD (E-W) I-10 WB RAMP
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MAS
Date of Analysis..... 8/9/95
Other Information..... 1995 PM PEAK HOUR
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	1>	1<	1	0	0	0
Stop/Yield			N			N						
Volumes	0	34			12	50	0	2	18			
PHF	.95	.95			.95	.95	.95	.95	.95			
Grade		0			0			0			0	
MC's (%)	0	0			0	0	0	0	0			
SU/RV's (%)	0	0			0	0	0	0	0			
CV's (%)	0	0			0	0	0	0	0			
PCE's	1.1	1.1			1.1	1.1	1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		12
Potential Capacity: (pcph)		1365
Movement Capacity: (pcph)		1365
Prob. of Queue-free State:		0.98

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		62
Potential Capacity: (pcph)		1602
Movement Capacity: (pcph)		1602
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		46
Potential Capacity: (pcph)		1032
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1032
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		71
Potential Capacity: (pcph)		963
Major LT, Minor TH Impedance Factor:		1.00
Adjusted Impedance Factor:		1.00
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		963

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB T	2	1032				2.8
EB R	21	1365	1328	2.8	A	

Intersection Delay = 0.6

APPENDIX D
Future Conditions Without the Project At-grade Crossing Analysis

2000 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
EAGLE MOUNTAIN TO FERRUM - Segment 1A										
NO CROSSINGS										
FERRUM TO COLTON YARD - Segment 1B										
Parkside Dr.	8	409	15	42	0.20	3,432		5.16	10	1.9
Bay Dr.	9	832	15	42	0.11	3,842		10.43	5	3.8
Cleveland St.	9	90	35	42	0.11	416		0.21		0.2
Hammond Rd.	9	484	35	42	0.11	2,237		1.13		1.1
66th Av.	9	4,732	35	42	0.11	21,863	5	10.38	6	11.7
62nd Av.	9	740	35	42	0.11	3,420		1.72		1.6
58th Av.	8	953	35	42	0.20	8,005		2.20		2.1
Airport Blvd.	9	6,940	35	42	0.11	32,061	3	14.76	3	18.4
Av. 54	GS	0	35	42	0.00	0		0.00		0.0
52nd Av.	9	1,497	35	42	0.11	6,917		3.43		3.4
5th St.	8	310	35	42	0.20	2,604		0.72		0.7
50th Av.	8	1,720	35	42	0.20	14,445	9	3.93		3.9
Dillon Rd.	9	8,769	35	42	0.11	40,511	1	18.15	1	24.6
South Indio Oh	GS	0	35	42	0.00	0		0.00		0.0
Jackson St. SR 10	GS	25,215	35	42	0.00	0		0.00		162.0
Monroe St. Oh	GS	0	35	42	0.00	0		0.00		0.0
Monroe St.	GS	11,221	35	42	0.00	0		0.00		34.4
Indio Oh St. 10	GS	0	35	42	0.00	0		0.00		0.0
Washington St. DVHD	GS	4,279	35	42	0.00	0		0.00		10.4
Monterey Av.	GS	0	35	42	0.00	0		0.00		0.0
Ramon Rd. Oh	GS	8,028	35	42	0.00	0		0.00		22.0
Date Palm Dr. Oh	GS	5,337	35	42	0.00	0		0.00		13.4
Palm Dr. Oh	GS	6,758	35	42	0.00	0		0.00		17.8
Indian Av. Oh	GS	6,955	35	42	0.00	0		0.00		18.4
Tipton Rd.	9	136	35	42	0.11	627		0.32		0.3
Palm Spr OVH St. 111	GS	0	35	42	0.00	0		0.00		0.0
Broadway	9	2,253	35	42	0.11	10,410	10	5.12		5.2
Apache Trail	9	4,566	35	42	0.11	21,097	6	10.04	7	11.2
Hargreave St.	9	4,551	35	42	0.11	21,024	7	10.01	8	11.2
San Gorgonio Av.	9A	4,461	35	42	0.11	20,608	8	9.83	9	10.9
Eight St.	GS	0	35	42	0.00	0		0.00		0.0
22nd St.	9	8,570	35	42	0.11	39,595	2	17.79	2	23.9
North Sunset Av.	9A	802	35	42	0.11	3,703		1.86		1.8
Highland Springs Av.	9	347	35	42	0.11	1,604		0.81		0.8
Pennsylvania Av.	9	756	35	42	0.11	3,492		1.75		1.7
Beaumont Av. St. 79	9	5,141	35	42	0.11	23,750	4	11.22	4	12.9
California Av.	9	1,739	35	42	0.11	8,033		3.98		3.9
Veile Av.	8	604	35	42	0.20	5,077		1.40		1.3
Beaumont Oh St. 60	GS	6,765	35	42	0.00	0		0.00		17.8
San Timoteo Cyn Rd.	9	544	35	42	0.11	2,515		1.26		1.2
Live Oak Cyn Rd.	9	1,164	35	42	0.11	5,380		2.68		2.6
Allesandro Rd.	9	932	35	42	0.11	4,305		2.15		2.1
San Timoteo Cyn Rd.	9	0	35	42	0.11	0		0.00		0.0
Beaumont Av.	9	364	35	42	0.11	1,680		0.85		0.8
Whittier Av.	9	213	35	42	0.11	983		0.50		0.5
Barton Rd. Oh	GS	0	35	42	0.00	0		0.00		0.0
Mountain View Av.	GS	0	35	42	0.00	0		0.00		0.0
Anderson St. Oh	GS	0	15	42	0.00	0		0.00		0.0
Waterman Av.	GS	0	15	42	0.00	0		0.00		0.0
Hunts Ln.	GS	0	15	42	0.00	0		0.00		0.0
Colton Loma Linda Yd	GS	0	15	42	0.00	0		0.00		0.0
Colton St. 15	GS	0	15	42	0.00	0		0.00		0.0
So. East Conn. Oh	GS	0	15	42	0.00	0		0.00		0.0
Mount Vernon Av.	GS	0	15	42	0.00	0		0.00		0.0

2000 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
TOTALS:						**313,637**		**153.80**		461.7
COLTON YARD TO INDUSTRY TRANSFER YARD - Segment 2										
Colton Yard	GS	0	15	43	0.00	0		0.00		0.0
La Cadena Dr. Up	GS	0	15	43	0.00	0		0.00		0.0
Rancho Av. Oh	GS	0	15	43	0.00	0		0.00		0.0
Pepper Av. Oh	GS	1,957	15	43	0.00	0		0.00		9.3
Riverside Av. Oh	GS	13,961	40	43	0.00	0		0.00		42.9
Cedar Av. Oh	GS	20,224	40	43	0.00	0		0.00		84.0
Sierra Av. Oh	GS	22,833	40	43	0.00	0		0.00		111.1
Citrus Av. Oh	GS	8,220	40	43	0.00	0		0.00		20.4
Cherry Av. Oh	GS	4,958	40	43	0.00	0		0.00		11.1
Etiwanda Av.	GS	12,656	40	43	0.00	0		0.00		36.8
Vina Vista Oh	GS	0	40	43	0.00	0		0.00		0.0
Milliken Av.	9	13,569	40	43	0.11	64,182	2	19.99	3	41.0
Haven Av.	GS	0	40	43	0.00	0		0.00		0.0
Turner Av.	9	1,043	40	43	0.11	4,935		1.85		2.1
Archibald Av.	9	4,437	40	43	0.11	20,986		7.49		9.8
Vineyard Av.	9	11,742	40	43	0.11	55,542	3	17.81	4	33.0
Grove Av. Up	GS	0	40	43	0.00	0		0.00		0.0
Bon View Av.	9	9,264	40	43	0.11	43,819	6	14.59	7	23.8
Campus Av.	9	6,915	40	43	0.11	32,709		11.27		16.4
Sultana Av.	9	4,566	40	43	0.11	21,598		7.70		10.1
Euclid Av. Up	GS	0	40	43	0.00	0		0.00		0.0
Euclid Av. State 83	9	28,705	40	43	0.11	135,775	1	32.04	1	227.9
Vine Av.	9	6,002	40	43	0.11	28,391		9.92		13.8
San Antonio Av.	9	5,611	40	43	0.11	26,538		9.32		12.8
Mountain Av. Oh	GS	0	40	43	0.00	0		0.00		0.0
Central Av. Oh	GS	0	40	43	0.00	0		0.00		0.0
Monte Vista Av.	9	6,785	40	43	0.11	32,091		11.08		16.0
Co Rd. Ramona Av.	9	9,677	40	43	0.11	45,773	5	15.15	6	25.2
East End Av.	9	7,738	40	43	0.11	36,598	7	12.47	8	18.9
Reservoir Av.	9	7,169	40	43	0.11	33,910	9	11.65	10	17.2
San Antonio Av.	9	7,569	40	43	0.11	35,800	8	12.22	9	18.4
Towne Av.	GS	0	40	43	0.00	0		0.00		0.0
Palamores St.	9	6,335	40	43	0.11	29,965		10.42		14.8
Garey Av.	GS	0	40	43	0.00	0		0.00		0.0
Main St.	9	3,549	40	43	0.11	16,789		6.07		7.6
Park Av.	9	6,957	40	43	0.11	32,907	10	11.34		16.5
White Av.	GS	0	40	43	0.00	0		0.00		0.0
Hamilton Bl.	9	11,201	40	43	0.11	52,980	4	17.13	5	30.8
State St. 71	GS	0	40	43	0.00	0		0.00		0.0
Humane Way	GS	0	40	43	0.00	0		0.00		0.0
Omar Oh	GS	0	40	43	0.00	0		0.00		0.0
Temple Av.	9	56	40	43	0.11	263		0.10		0.1
Pomona Bl.	9	4,057	40	43	0.11	19,190		6.89		8.8
Brea Canyon Rd.	9	4,417	40	43	0.11	20,891		7.46		9.7
Lemon Rd.	9	2,320	40	43	0.11	10,974		4.03		4.8
Fairway Dr.	9	0	40	43	0.11	0		0.00		0.0
Nogales Av.	9	2,601	15	43	0.11	12,304		31.87	2	12.6
Fullerton Rd.	GS	0	15	43	0.00	0		0.00		0.0
Azusa Av. Oh	GS	3,340	15	43	0.00	0		0.00		16.5
TOTALS:						**814,909**		**289.85**		924.0
INUSTRY TRANSFER STATION TO BASSETT JUNCTION - SEGMENT 3										
Brea Canyon	9	10,283	60	28	0.11	31,673	4	7.12	4	20.1
Lemon	9	8,140	60	28	0.11	25,072	5	5.82	5	14.8
Fairway	9	340	60	28	0.11	1,048	9	0.27	9	0.5

2000 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Nogales	9	31,934	60	28	0.11	98,356	1	14.82	1	285.8
California	9	6,177	60	28	0.11	19,024	7	4.54	7	10.5
Sunset	9	18,056	60	28	0.11	55,614	2	11.02	2	49.1
Orange	9	4,097	60	28	0.11	12,618	8	3.10	8	6.6
Puente	9	17,013	60	28	0.11	52,400	3	10.57	3	44.0
Vineland	9	6,782	60	28	0.11	20,887	6	4.95	6	11.8
TOTALS:						**316,691**		**62.22**		443.2
BASSETT JUNCTION TO SOUTHERN PACIFIC LA TRANSPORTATION CENTER - SEGMENT 4										
Temple	9	20,128	60	28	0.11	61,995	7	11.85		61.1
Cogswell	9	6,309	50	28	0.11	19,433		6.66		12.4
Peck	9	34,781	40	28	0.11	107,125	2	33.84	4	797.3
Ramona	9	34,927	30	28	0.11	107,577	1	60.06	2	1060.5
Cypress	9	4,169	30	28	0.11	12,840		12.54		11.5
Tyler	9	14,613	30	28	0.11	45,009		37.56	3	58.3
Arden	9	13,746	35	28	0.11	42,337		26.35	7	46.6
Baldwin	9	26,240	40	28	0.11	80,818	4	30.82	5	164.6
Temple City	9	22,534	45	28	0.11	69,404	5	22.49	9	98.0
Lower Azusa	9	12,394	50	28	0.11	38,172		11.93		30.0
Encinita	9	5,859	50	28	0.11	18,045		6.22		11.3
Walnut Grove	9	5,076	50	28	0.11	15,633		5.45		9.6
San Gabriel	9	34,437	50	28	0.11	106,067	3	21.67	10	600.1
Del Mar	9	14,956	50	28	0.11	46,064	10	13.82		40.3
Mission	9	16,354	50	28	0.11	50,370	9	14.77		46.9
Ramona	9	17,856	50	28	0.11	54,996	8	15.72		55.0
Valley	9	21,980	25	28	0.11	67,697	6	71.50	1	149.4
Boca	NA	6,535	25	28	0.00	0		27.34	6	22.6
Vineburn	NA	2,274	20	28	0.00	0		15.76		8.4
San Pablo	NA	3,380	20	28	0.00	0		23.07	8	12.9
TOTALS:						**943,582**		**469.39**		3296.9
SP LA TRANSPORTATION CENTER TO NORTHERN ORANGE CO - SEGMENT 5										
Washington Blvd	NA	27,210	10	20	0.00	0		498.06	2	628.7
Santa Fe Ave	NA	17,238	10	20	0.00	0		380.03	3	207.0
25th St	NA	5,070	10	20	0.00	0		134.92		38.4
E. Alameda st	NA	9,014	10	20	0.00	0		226.52	6	77.5
41st Street	4	11,177	10	24	0.34	91,203	4	271.81	5	103.9
Vernon Ave	4	13,633	10	4	0.34	18,541		318.99	4	139.5
51st Street	4	225	10	2	0.34	153		6.41		1.5
55th Street	8	6,974	10	28	0.20	39,056		180.61	8	56.0
Slauson Ave	8	31,885	10	28	0.20	178,558	1	527.71	1	1300.1
Randolph St	8	7,594	20	28	0.20	42,526	10	48.83		33.0
Gage Ave	9	19,266	20	28	0.11	59,341	7	102.74		136.1
Florence Ave	9	29,643	20	20	0.11	65,215	6	129.17		469.3
Nadeau st	9	14,084	20	20	0.11	30,984		81.97		77.9
Santa Fe Ave	9	10,028	15	10	0.11	11,030		110.43		61.4
Long Beach Blvd	9	20,618	15	30	0.11	68,041	5	190.61	7	203.2
State St	9	13,520	20	10	0.11	14,872		79.40		73.1
California Ave	9	12,394	20	10	0.11	13,633		74.10		64.0
San Juan Ave	9	3,380	20	6	0.11	2,231		23.07		12.9
Otis Ave	9	13,520	20	10	0.11	14,872		79.40		73.1
Atlantic Ave	9	28,167	20	10	0.11	30,984		126.64		379.0
Garfield Ave	9	27,153	20	4	0.11	11,947		124.67		331.2
Firestone Blvd	9	48,560	20	6	0.11	32,050		125.25		-608.4
Rives Ave	9	9,014	20	6	0.11	5,949		56.75		41.1
Paramount Bvlvd	9	27,829	20	2	0.11	6,122		126.01		362.0
Downey Ave	9	10,692	20	6	0.11	7,057		65.64		51.8
Dolan Ave	9	406	20	12	0.11	535		2.88		1.4

2000 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Brookshire Ave	9	9,577	20	12	0.11	12,641		59.79		44.6
Patton Rd	9	9,014	20	12	0.11	11,898		56.75		41.1
Lakewood Blvd	9	38,308	20	30	0.11	126,415	2	135.72	9	-16480.3
Woodruff Ave	9	15,774	20	30	0.11	52,053	8	89.30		93.9
Stewart & Gray Rd	9	9,464	20	10	0.11	10,411		59.19		43.9
Regent View Ave	9	2,704	20	10	0.11	2,974		18.63		10.1
Hoxie Ave	8A	113	20	6	0.11	74		0.80		0.4
Studebaker Rd	8	13,768	20	6	0.20	16,522		80.54		75.2
Orr & Day Rd	8	28	20	4	0.20	23		0.20		0.1
Pioneer Blvd	9	16,844	20	6	0.11	11,117		93.66		105.3
San Antonio Blvd	9	19,830	20	6	0.11	13,088		104.70		144.4
Funston Ave	8	3,718	20	6	0.20	4,462		25.26		14.3
Rosecrans Ave	9	31,547	20	6	0.11	20,821		131.82		646.8
Bloomfield Ave	9	7,887	20	6	0.11	5,205		50.49		34.6
Shoemaker Ave	9	513	20	4	0.11	226		3.64		1.8
Carmenita Rd	8	3,380	20	6	0.20	4,056		23.07		12.9
Alondra Blvd	9	4,507	20	10	0.11	4,957		30.29		17.8
Marquardt Ave	9A	338	20	4	0.11	149		2.40		1.2
Valley View Ave	9	2,253	20	10	0.11	2,479		15.62		8.3
Artesia Blvd	9	28,167	20	12	0.11	37,181		126.64		379.0
Knott Ave	9	22,534	20	12	0.11	29,745		113.25		192.8
Western Ave	9A	16,900	20	12	0.11	22,308		93.88		106.0
Beach Blvd	9	38,308	20	30	0.11	126,415	3	135.72	10	-16480.3
Stanton Ave	9	13,070	20	30	0.11	43,130	9	77.31		69.4
TOTALS:						**1,303,250**		**5621.28**		#####
COLTON YARD TO LA VERNE TRANSFER STATION - SEGMENT 6										
Meridian Ave	NA	676	50	2	0.00	0		0.77		1.1
Pepper Ave	8	11,267	50	2	0.20	4,507	7	11.04	10	26.2
Eucalyptus Ave	3	2,253	50	2	0.34	1,532		2.52		3.9
Acacia Ave	9	3,380	60	2	0.11	744		2.59		5.3
Sycamore Ave	3	3,943	60	2	0.34	2,682		2.99		6.3
Date Ave	3	225	60	2	0.34	153		0.18		0.3
Olive Ave	3	225	60	2	0.34	153		0.18		0.3
Riverside Ave	9	13,520	60	2	0.11	2,974		8.90		30.0
Orange Ave	3	225	60	2	0.34	153		0.18		0.3
Palm Ave	3	563	60	2	0.34	383		0.45		0.8
Willow Ave	9	2,253	60	2	0.11	496		1.75		3.4
Lilac Ave	9	1,915	60	2	0.11	421		1.49		2.9
Cactus Ave	9	2,817	60	2	0.11	620		2.17		4.3
Cedar Ave	9	2,817	60	2	0.11	620		2.17		4.3
Linden Ave	3	789	60	2	0.34	536		0.62		1.2
Maple Ave	3	563	60	2	0.34	383		0.45		0.8
Locust Ave	3	2,704	60	2	0.34	1,839		2.09		4.2
Laurel Ave	3	759	60	2	0.34	516		0.60		1.1
Alder Ave	9A	4,619	60	2	0.11	1,016		3.47		7.5
Tamarind Ave	3	1,915	60	2	0.34	1,302		1.49		2.9
Palmetto Ave	3	3,267	60	2	0.34	2,222		2.50		5.1
Mango Ave	8	6,760	60	2	0.20	2,704		4.93		11.7
Sierra Ave	8	13,858	60	2	0.20	5,543	6	9.07		31.2
Juniper Ave	9	5,859	50	2	0.11	1,289		6.22		11.3
Cypress Ave	3	2,817	50	2	0.34	1,915		3.12		5.0
Oleander Ave	3	2,817	50	2	0.34	1,915		3.12		5.0
Citrus Ave	9A	3,380	50	2	0.11	744		3.72		6.1
Tokay Ave	NA	394	50	2	0.00	0		0.45		0.7
Almeria Ave	NA	169	50	2	0.00	0		0.19		0.3
Sultana Ave	NA	23	50	2	0.00	0		0.03		0.0
Hemlock Ave	NA	113	50	2	0.00	0		0.13		0.2

2000 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Miller Ave	NA	282	50	2	0.00	0		0.32		0.5
Redwood Ave	NA	282	50	2	0.00	0		0.32		0.5
Base Line St	NA	1,127	50	2	0.00	0		1.28		1.9
East Ave	3	676	50	2	0.34	460		0.77		1.1
Etiwanda Ave	9	2,817	50	2	0.11	620		3.12		5.0
Milliken Ave	9	5,633	50	2	0.11	1,239		6.00		10.8
Haven Ave	9	8,338	50	2	0.11	1,834		8.54		17.5
Hermosa Ave	3	676	50	2	0.34	460		0.77		1.1
Ramona Ave	3	225	50	2	0.34	153		0.26		0.4
Archibald Ave	9	3,831	50	2	0.11	843		4.18		7.0
Amethyst Ave	3	2,704	50	2	0.34	1,839		3.00		4.8
Base Line St	9	9,014	50	2	0.11	1,983		9.14		19.3
Hellman Ave	3	2,817	50	2	0.34	1,915		3.12		5.0
Grove Ave	9A	9,915	50	2	0.11	2,181		9.92		21.9
11th St	NA	676	50	2	0.00	0		0.77		1.1
10th St	NA	676	50	2	0.00	0		0.77		1.1
9th St	NA	676	50	2	0.00	0		0.77		1.1
8th St	NA	676	50	2	0.00	0		0.77		1.1
Campus Ave	3	5,408	50	2	0.34	3,678	8	5.78		10.3
6th St	3	676	50	2	0.34	460		0.77		1.1
3rd St	3	2,817	50	2	0.34	1,915		3.12		5.0
2nd St	3	2,141	50	2	0.34	1,456		2.39		3.7
1st St	3	1,127	50	2	0.34	766		1.28		1.9
Euclid Ave	9	27,717	50	2	0.11	6,098	3	20.26	8	167.3
Laurel Ave	NA	563	50	2	0.00	0		0.64		0.9
Palm Ave	NA	563	50	2	0.00	0		0.64		0.9
San Antonio Ave	3	8,338	50	2	0.34	5,670	5	8.54		17.5
Mountain Ave	9	15,098	40	2	0.11	3,321	10	21.70	7	48.6
Benson Ave	NA	3,943	40	2	0.00	0		6.71		8.5
Central Ave	9A	15,774	40	2	0.11	3,470	9	22.42	6	52.4
Claremont Blvd	9	0	30	2	0.11	0		0.00		0.0
Towne Ave	9	8,970	30	2	0.11	1,973		25.17	4	28.8
Garey Ave	9	13,182	30	4	0.11	5,800	4	34.67	2	49.6
Pine St	NA	8,970	30	28	0.00	0		25.17	5	28.8
Fulton Rd	9	13,182	30	8	0.11	11,600	1	34.67	1	49.6
White Ave	9	10,256	30	8	0.11	9,026	2	28.23	3	34.5
Arrow Hwy	9	2,253	30	4	0.11	991		6.96		5.9
E Street	3	1,127	30	4	0.34	1,532		3.53		2.9
D Street	NA	5,633	30	4	0.00	0		16.60	9	16.2
TOTALS:						**108,647**		**402.68**		819.2
LA VERNE TRANSFER STATION TO IRWINDALE TRANSFER STATION - SEGMENT 7										
San Dimas Cyn Rd	9	0	40	4	0.11	0		0.00		0.0
Walnut Ave	9A	169	40	4	0.11	74		0.30		0.3
San Dimas Ave	9	169	40	4	0.11	74		0.30		0.3
Cataract Ave	9A	169	40	4	0.11	74		0.30		0.3
Lone Hill Ave	9	451	40	4	0.11	198		0.80		0.9
Valley Center Ave	9	3,031	40	4	0.11	1,334	7	5.22	8	6.4
Sunflower Ave	9A	4,867	40	4	0.11	2,142	5	8.17	6	10.8
Covina Blvd	9A	3,943	40	4	0.11	1,735	6	6.71	7	8.5
Bonnie Cove Ave	9	163	40	4	0.11	72		0.29		0.3
Cypress St	8	845	40	4	0.20	676	10	1.50	10	1.7
Glendora Ave	8	107	40	4	0.20	86		0.19		0.2
Grand Ave	9	2,366	40	4	0.11	1,041	9	4.11	9	4.9
Barranca Ave	8	10,140	30	4	0.20	8,112	1	27.96	2	34.0
Citrus Ave	9	2,670	30	4	0.11	1,175	8	8.20	5	7.1
Hollenbeck Ave	8	8,450	30	4	0.20	6,760	2	23.90	3	26.7
Azusa Ave	9	14,534	30	4	0.11	6,395	3	37.40	1	57.8

2000 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Lark Ellen Ave	9	451	30	4	0.11	198		1.43		1.1
Vincent Ave	9A	451	30	4	0.11	198		1.43		1.1
Irwindale Ave	8	7,005	30	4	0.20	5,604	4	20.23	4	21.1
TOTALS:						**35,949**		**148.45**		183.5
IRWINDALE TRANSFER STATION TO BASSETT JUNCTION - SEGMENT 8										
Cypress St	NA	23	20	4	0.00	0	3	0.16	3	0.1
Ramon Bl/Dowling Ave.	9	23	20	4	0.11	10	1	0.16	1	0.1
Pacific Ave	NA	23	20	4	0.00	0	4	0.16	4	0.1
MacDevitt St	NA	23	20	4	0.00	0	5	0.16	5	0.1
Merced Ave	NA	23	20	4	0.00	0	6	0.16	6	0.1
Francisquito Ave	9	23	20	4	0.11	10	2	0.16	2	0.1
Dalewood St	NA	23	20	4	0.00	0	7	0.16	7	0.1
Amar Rd	NA	23	20	4	0.00	0	8	0.16	8	0.1
TOTALS:						**20**		**1.29**		0.6

2005 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
EAGLE MOUNTAIN TO FERRUM - Segment 1A										
NO CROSSINGS										
FERRUM TO COLTON YARD - Segment 1B										
Parkside Dr.	8	808	15	42	0.20	6,791		10.15	10	3.7
Bay Dr.	9	1,646	15	42	0.11	7,602		20.42	5	7.8
Cleveland St.	9	178	35	42	0.11	824		0.42		0.4
Hammond Rd.	9	958	35	42	0.11	4,427		2.21		2.1
66th Av.	9	9,364	35	42	0.11	43,263	5	19.21	6	26.9
62nd Av.	9	1,465	35	42	0.11	6,767		3.36		3.3
58th Av.	8	1,886	35	42	0.20	15,840		4.30		4.3
Airport Blvd.	9	13,733	35	42	0.11	63,444	3	26.33	3	46.5
Av. 54	GS	0	35	42	0.00	0		0.00		0.0
52nd Av.	9	2,963	35	42	0.11	13,689		6.66		6.9
5th St.	8	614	35	42	0.20	5,153		1.42		1.3
50th Av.	8	3,403	35	42	0.20	28,584	9	7.61		8.1
Dillon Rd.	9	17,352	35	42	0.11	80,165	1	31.34	1	69.0
South Indio Oh	GS	0	35	42	0.00	0		0.00		0.0
Jackson St. SR 10	GS	49,896	35	42	0.00	0		0.00		-344.5
Monroe St. Oh	GS	0	35	42	0.00	0		0.00		0.0
Monroe St.	GS	22,205	35	42	0.00	0		0.00		115.5
Indio Oh St. 10	GS	0	35	42	0.00	0		0.00		0.0
Washington St. DVHD	GS	8,468	35	42	0.00	0		0.00		23.6
Monterey Av.	GS	0	35	42	0.00	0		0.00		0.0
Ramon Rd. Oh	GS	15,887	35	42	0.00	0		0.00		59.0
Date Palm Dr. Oh	GS	10,560	35	42	0.00	0		0.00		31.6
Palm Dr. Oh	GS	13,373	35	42	0.00	0		0.00		44.6
Indian Av. Oh	GS	13,763	35	42	0.00	0		0.00		46.6
Tipton Rd.	9	269	35	42	0.11	1,241		0.63		0.6
Palm Spr OVH St. 111	GS	0	35	42	0.00	0		0.00		0.0
Broadway	9	4,459	35	42	0.11	20,599	10	9.82		10.9
Apache Trail	9	9,036	35	42	0.11	41,747	6	18.63	7	25.6
Hargreave St.	9	9,005	35	42	0.11	41,604	7	18.58	8	25.5
San Gorgonio Av.	9A	8,827	35	42	0.11	40,780	8	18.26	9	24.9
Eight St.	GS	0	35	42	0.00	0		0.00		0.0
22nd St.	9	16,959	35	42	0.11	78,352	2	30.83	2	66.2
North Sunset Av.	9A	1,586	35	42	0.11	7,328		3.63		3.6
Highland Springs Av.	9	687	35	42	0.11	3,175		1.59		1.5
Pennsylvania Av.	9	1,496	35	42	0.11	6,910		3.43		3.4
Beaumont Av. St. 79	9	10,173	35	42	0.11	46,998	4	20.62	4	30.0
California Av.	9	3,441	35	42	0.11	15,897		7.69		8.2
Veile Av.	8	1,196	35	42	0.20	10,047		2.76		2.7
Beaumont Oh St. 60	GS	13,388	35	42	0.00	0		0.00		44.7
San Timoteo Cyn Rd.	9	1,077	35	42	0.11	4,977		2.49		2.4
Live Oak Cyn Rd.	9	2,304	35	42	0.11	10,645		5.23		5.3
Allesandro Rd.	9	1,873	35	42	0.11	8,655		4.28		4.3
San Timateo Cyn Rd.	9	0	35	42	0.11	0		0.00		0.0
Beaumont Av.	9	731	35	42	0.11	3,376		1.69		1.6
Whittier Av.	9	428	35	42	0.11	1,976		1.00		0.9
Barton Rd. Oh	GS	0	35	42	0.00	0		0.00		0.0
Mountain View Av.	GS	0	35	42	0.00	0		0.00		0.0
Anderson St. Oh	GS	0	15	42	0.00	0		0.00		0.0
Waterman Av.	GS	0	15	42	0.00	0		0.00		0.0
Hunts Ln.	GS	0	15	42	0.00	0		0.00		0.0
Colton Loma Linda Yd	GS	0	15	42	0.00	0		0.00		0.0
Colton St. 15	GS	0	15	42	0.00	0		0.00		0.0
So. East Conn. Oh	GS	0	15	42	0.00	0		0.00		0.0
Mount Vernon Av.	GS	0	15	42	0.00	0		0.00		0.0

2005 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
TOTALS:						**620,858**		**284.59**		418.9
COLTON YARD TO INDUSTRY TRANSFER YARD - Segment 2										
Azusa Av. Oh	GS	6,736	15	43	0.00	0		0.00		36.9
Fullerton Rd.	GS	0	15	43	0.00	0		0.00		0.0
Nogales Av.	9	5,247	15	43	0.11	24,817		61.96	1	27.4
Fairway Dr.	9	0	40	43	0.11	0		0.00		0.0
Lemon Rd.	9	4,680	40	43	0.11	22,135		7.88		10.4
Brea Canyon Rd.	9	8,909	40	43	0.11	42,138		14.11		22.6
Pomona Bl.	9	8,183	40	43	0.11	38,706		13.10		20.3
Temple Av.	9	112	40	43	0.11	530		0.20		0.2
Omar Oh	GS	0	40	43	0.00	0		0.00		0.0
Humane Way	GS	0	40	43	0.00	0		0.00		0.0
State St. 71	GS	0	40	43	0.00	0		0.00		0.0
Hamilton Bl.	9	22,592	40	43	0.11	106,862	4	28.48	4	108.2
White Av.	GS	0	40	43	0.00	0		0.00		0.0
Park Av.	9	14,033	40	43	0.11	66,374	10	20.52		43.2
Main St.	9	7,159	40	43	0.11	33,863		11.63		17.1
Garey Av.	GS	0	40	43	0.00	0		0.00		0.0
Palamores St.	9	12,778	40	43	0.11	60,441		19.07		37.4
Towne Av.	GS	0	40	43	0.00	0		0.00		0.0
San Antonio Av.	9	15,266	40	43	0.11	72,208	8	21.88	9	49.5
Reservoir Av.	9	14,460	40	43	0.11	68,396	9	21.00	10	45.3
East End Av.	9	15,607	40	43	0.11	73,819	7	22.24	8	51.4
Co Rd. Ramona Av.	9	19,453	40	43	0.11	92,010	5	25.96	5	77.4
Monte Vista Av.	9	13,638	40	43	0.11	64,508		20.07		41.3
Central Av. Oh	GS	0	40	43	0.00	0		0.00		0.0
Mountain Av. Oh	GS	0	40	43	0.00	0		0.00		0.0
San Antonio Av.	9	11,278	40	43	0.11	53,346		17.23		31.1
Vine Av.	9	12,066	40	43	0.11	57,070		18.21		34.3
Euclid Av. State 83	9	57,701	40	43	0.11	272,928	1	24.92	7	-216.1
Euclid Av. Up	GS	0	40	43	0.00	0		0.00		0.0
Sultana Av.	9	9,179	40	43	0.11	43,415		14.48		23.5
Campus Av.	9	13,900	40	43	0.11	65,749		20.37		42.6
Bon View Av.	9	18,622	40	43	0.11	88,083	6	25.22	6	70.9
Grove Av. Up	GS	0	40	43	0.00	0		0.00		0.0
Vineyard Av.	9	23,604	40	43	0.11	111,647	3	29.19	3	121.0
Archibald Av.	9	8,919	40	43	0.11	42,185		14.12		22.6
Turner Av.	9	2,097	40	43	0.11	9,920		3.66		4.3
Haven Av.	GS	0	40	43	0.00	0		0.00		0.0
Milliken Av.	9	27,276	40	43	0.11	129,016	2	31.37	2	187.7
Vina Vista Oh	GS	0	40	43	0.00	0		0.00		0.0
Etiwanda Av.	GS	25,441	40	43	0.00	0		0.00		149.5
Cherry Av. Oh	GS	9,966	40	43	0.00	0		0.00		26.2
Citrus Av. Oh	GS	16,523	40	43	0.00	0		0.00		56.8
Sierra Av. Oh	GS	45,898	40	43	0.00	0		0.00		-428.8
Cedar Av. Oh	GS	40,654	40	43	0.00	0		0.00		-1130.3
Riverside Av. Oh	GS	28,063	40	43	0.00	0		0.00		208.4
Pepper Av. Oh	GS	3,934	15	43	0.00	0		0.00		19.8
Rancho Av. Oh	GS	0	15	43	0.00	0		0.00		0.0
La Cadena Dr. Up	GS	0	15	43	0.00	0		0.00		0.0
Colton Yard	GS	0	15	43	0.00	0		0.00		0.0
TOTALS:						**1,640,168**		**486.86**		-187.8
INUSTRY TRANSFER STATION TO BASSETT JUNCTION - SEGMENT 3										
Brea Canyon	9	20,742	60	28	0.11	63,884	4	12.07	3	65.2
Lemon	9	16,419	60	28	0.11	50,571	5	10.31	4	41.3
Fairway	9	686	60	28	0.11	2,114	9	0.54	9	1.0

2005 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Nogales	9	64,411	60	28	0.11	198,385	1	7.86	7	-132.4
California	9	12,458	60	28	0.11	38,371	7	8.34	6	26.5
Sunset	9	36,420	60	28	0.11	112,173	2	15.19	1	1251.2
Orange	9	8,263	60	28	0.11	25,450	8	5.90	8	15.1
Puente	9	34,315	60	28	0.11	105,692	3	15.07	2	505.6
Vineland	9	13,678	60	28	0.11	42,130	6	8.98	5	30.5
TOTALS:						**638,770**		**84.26**		1804.0
BASSETT JUNCTION TO SOUTHERN PACIFIC LA TRANSPORTATION CENTER - SEGMENT 4										
Temple	9	40,599	60	28	0.11	125,045	7	15.14		-847.9
Cogswell	9	12,726	50	28	0.11	39,197		12.19		31.3
Peck	9	70,154	40	28	0.11	216,073	2	9.68		-161.0
Ramona	9	70,449	30	28	0.11	216,983	1	16.37		-202.5
Cypress	9	8,408	30	28	0.11	25,898		23.79	9	26.5
Tyler	9	29,475	30	28	0.11	90,783		57.41	2	322.5
Arden	9	27,725	35	28	0.11	85,393		41.21	5	221.7
Baldwin	9	52,925	40	28	0.11	163,010	4	28.82	7	-261.6
Temple City	9	45,451	45	28	0.11	139,989	5	25.92	8	-410.4
Lower Azusa	9	24,998	50	28	0.11	76,994		19.30		119.4
Encinita	9	11,817	50	28	0.11	36,397		11.48		28.0
Walnut Grove	9	10,238	50	28	0.11	31,533		10.19		22.9
San Gabriel	9	69,460	50	28	0.11	213,938	3	6.88		-137.1
Del Mar	9	30,166	50	28	0.11	92,911	10	20.93		239.1
Mission	9	32,986	50	28	0.11	101,597	9	21.48		408.4
Ramona	9	36,015	50	28	0.11	110,927	8	21.80	10	1126.7
Valley	9	44,333	25	28	0.11	136,545	6	84.55	1	-762.3
Boca	NA	13,181	25	28	0.00	0		49.86	3	57.8
Vineburn	NA	4,586	20	28	0.00	0		30.78	6	18.2
San Pablo	NA	6,818	20	28	0.00	0		44.33	4	28.9
TOTALS:						**1,903,213**		**552.13**		-131.6
SP LA TRANSPORTATION CENTER TO NORTHERN ORANGE CO - SEGMENT 5										
Washington Blvd	NA	54,882	10	20	0.00	0		434.82	4	-810.5
Santa Fe Ave	NA	34,770	10	20	0.00	0		537.83	1	2683.9
25th St	NA	10,226	10	20	0.00	0		252.35	8	91.8
E. Alameda st	NA	18,180	10	20	0.00	0		394.37	5	228.7
41st Street	4	22,544	10	24	0.34	183,956	4	452.12	3	363.6
Vernon Ave	4	27,498	10	4	0.34	37,397		500.36	2	652.8
51st Street	4	455	10	2	0.34	309		12.88		3.0
55th Street	8	14,067	10	28	0.20	78,776		326.85	6	146.5
Slauson Ave	8	64,313	10	28	0.20	360,153	1	281.98	7	-609.4
Randolph St	8	15,317	20	28	0.20	85,775	10	87.37		89.3
Gage Ave	9	38,861	20	28	0.11	119,691	7	135.66		-5974.1
Florence Ave	9	59,791	20	20	0.11	131,540	6	91.10		-363.0
Nadeau st	9	28,407	20	20	0.11	62,495		127.08		391.8
Santa Fe Ave	9	20,226	15	10	0.11	22,248		188.30	10	194.9
Long Beach Blvd	9	41,588	15	30	0.11	137,239	5	238.89	9	-1985.8
State St	9	27,271	20	10	0.11	29,998		124.91		336.3
California Ave	9	24,998	20	10	0.11	27,498		119.84		254.4
San Juan Ave	9	6,818	20	6	0.11	4,500		44.33		28.9
Otis Ave	9	27,271	20	10	0.11	29,998		124.91		336.3
Atlantic Ave	9	56,814	20	10	0.11	62,495		102.46		-399.5
Garfield Ave	9	54,768	20	4	0.11	24,098		109.30		-432.1
Firestone Blvd	9	97,947	20	6	0.11	64,645		-202.06		-216.2
Rives Ave	9	18,180	20	6	0.11	11,999		98.81		121.4
Paramount Bvlvd	9	56,132	20	2	0.11	12,349		104.83		-409.6
Downey Ave	9	21,566	20	6	0.11	14,234		110.35		173.6
Dolan Ave	9	818	20	12	0.11	1,080		5.78		2.9

2005 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Brookshire Ave	9	19,317	20	12	0.11	25,498		102.92		136.8
Patton Rd	9	18,180	20	12	0.11	23,998		98.81		121.4
Lakewood Blvd	9	77,267	20	30	0.11	254,980	2	-9.20		-260.3
Woodruff Ave	9	31,816	20	30	0.11	104,992	8	132.14		680.6
Stewart & Gray Rd	9	19,089	20	10	0.11	20,998		102.12		133.5
Regent View Ave	9	5,454	20	10	0.11	6,000		36.17		22.2
Hoxie Ave	8A	227	20	6	0.11	150		1.62		0.8
Studebaker Rd	8	27,771	20	6	0.20	33,325		125.89		359.2
Orr & Day Rd	8	57	20	4	0.20	45		0.41		0.2
Pioneer Blvd	9	33,975	20	6	0.11	22,423		134.21		1116.6
San Antonio Blvd	9	39,997	20	6	0.11	26,398		135.36		-2649.9
Funston Ave	8	7,499	20	6	0.20	8,999		48.29		32.5
Rosecrans Ave	9	63,631	20	6	0.11	41,997		73.98		-328.4
Bloomfield Ave	9	15,908	20	6	0.11	10,499		89.85		95.3
Shoemaker Ave	9	1,034	20	4	0.11	455		7.29		3.7
Carmenita Rd	8	6,818	20	6	0.20	8,181		44.33		28.9
Alondra Blvd	9	9,090	20	10	0.11	9,999		57.17		41.6
Marquardt Ave	9A	682	20	4	0.11	300		4.83		2.4
Valley View Ave	9	4,545	20	10	0.11	5,000		30.53		18.0
Artesia Blvd	9	56,814	20	12	0.11	74,994		102.46		-399.5
Knott Ave	9	45,451	20	12	0.11	59,995		130.51		-807.0
Western Ave	9A	34,088	20	12	0.11	44,996		134.29		1152.9
Beach Blvd	9	77,267	20	30	0.11	254,980	3	-9.20		-260.3
Stanton Ave	9	26,362	20	30	0.11	86,993	9	123.00		299.7
TOTALS:						**2,628,668**		**6503.16**		#####
COLTON YARD TO LA VERNE TRANSFER STATION - SEGMENT 6										
Meridian Ave	NA	1,364	50	2	0.00	0		1.54		2.3
Pepper Ave	8	22,725	50	2	0.20	9,090	7	18.33	9	92.4
Eucalyptus Ave	3	4,545	50	2	0.34	3,091		4.92		8.4
Acacia Ave	9	6,818	60	2	0.11	1,500		4.97		11.9
Sycamore Ave	3	7,954	60	2	0.34	5,409		5.70		14.4
Date Ave	3	455	60	2	0.34	309		0.36		0.7
Olive Ave	3	455	60	2	0.34	309		0.36		0.7
Riverside Ave	9	27,271	60	2	0.11	6,000		14.00		138.0
Orange Ave	3	455	60	2	0.34	309		0.36		0.7
Palm Ave	3	1,136	60	2	0.34	773		0.90		1.7
Willow Ave	9	4,545	60	2	0.11	1,000		3.42		7.4
Lilac Ave	9	3,863	60	2	0.11	850		2.94		6.1
Cactus Ave	9	5,681	60	2	0.11	1,250		4.21		9.5
Cedar Ave	9	5,681	60	2	0.11	1,250		4.21		9.5
Linden Ave	3	1,591	60	2	0.34	1,082		1.25		2.4
Maple Ave	3	1,136	60	2	0.34	773		0.90		1.7
Locust Ave	3	5,454	60	2	0.34	3,709		4.05		9.1
Laurel Ave	3	1,532	60	2	0.34	1,042		1.20		2.3
Alder Ave	9A	9,317	60	2	0.11	2,050		6.55		17.6
Tamarind Ave	3	3,863	60	2	0.34	2,627		2.94		6.1
Palmetto Ave	3	6,590	60	2	0.34	4,481		4.82		11.4
Mango Ave	8	13,635	60	2	0.20	5,454		8.96		30.4
Sierra Ave	8	27,952	60	2	0.20	11,181	6	14.15		151.0
Juniper Ave	9	11,817	50	2	0.11	2,600		11.48		28.0
Cypress Ave	3	5,681	50	2	0.34	3,863		6.05		10.9
Oleander Ave	3	5,681	50	2	0.34	3,863		6.05		10.9
Citrus Ave	9A	6,818	50	2	0.11	1,500		7.14		13.6
Tokay Ave	NA	795	50	2	0.00	0		0.91		1.3
Almeria Ave	NA	341	50	2	0.00	0		0.39		0.6
Sultana Ave	NA	45	50	2	0.00	0		0.05		0.1
Hemlock Ave	NA	227	50	2	0.00	0		0.26		0.4

2005 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Miller Ave	NA	568	50	2	0.00	0		0.65		0.9
Redwood Ave	NA	568	50	2	0.00	0		0.65		0.9
Base Line St	NA	2,273	50	2	0.00	0		2.54		3.9
East Ave	3	1,364	50	2	0.34	927		1.54		2.3
Etiwanda Ave	9	5,681	50	2	0.11	1,250		6.05		10.9
Milliken Ave	9	11,363	50	2	0.11	2,500		11.12		26.5
Haven Ave	9	16,817	50	2	0.11	3,700		15.07		49.3
Hermosa Ave	3	1,364	50	2	0.34	927		1.54		2.3
Ramona Ave	3	455	50	2	0.34	309		0.52		0.8
Archibald Ave	9	7,727	50	2	0.11	1,700		7.99		15.8
Amethyst Ave	3	5,454	50	2	0.34	3,709		5.82		10.4
Base Line St	9	18,180	50	2	0.11	4,000		15.91		57.0
Hellman Ave	3	5,681	50	2	0.34	3,863		6.05		10.9
Grove Ave	9A	19,998	50	2	0.11	4,400		16.95		69.0
11th St	NA	1,364	50	2	0.00	0		1.54		2.3
10th St	NA	1,364	50	2	0.00	0		1.54		2.3
9th St	NA	1,364	50	2	0.00	0		1.54		2.3
8th St	NA	1,364	50	2	0.00	0		1.54		2.3
Campus Ave	3	10,908	50	2	0.34	7,418	8	10.75		25.0
6th St	3	1,364	50	2	0.34	927		1.54		2.3
3rd St	3	5,681	50	2	0.34	3,863		6.05		10.9
2nd St	3	4,318	50	2	0.34	2,936		4.69		8.0
1st St	3	2,273	50	2	0.34	1,545		2.54		3.9
Euclid Ave	9	55,905	50	2	0.11	12,299	3	17.01	10	-193.9
Laurel Ave	NA	1,136	50	2	0.00	0		1.29		1.9
Palm Ave	NA	1,136	50	2	0.00	0		1.29		1.9
San Antonio Ave	3	16,817	50	2	0.34	11,435	5	15.07		49.3
Mountain Ave	9	30,452	40	2	0.11	6,699	10	32.74	7	297.7
Benson Ave	NA	7,954	40	2	0.00	0		12.77		19.5
Central Ave	9A	31,816	40	2	0.11	6,999	9	33.18	6	379.6
Claremont Blvd	9	0	30	2	0.11	0		0.00		0.0
Towne Ave	9	18,092	30	2	0.11	3,980		43.86	4	84.8
Garey Ave	9	26,589	30	4	0.11	11,699	4	55.00	2	217.4
Pine St	NA	18,092	30	28	0.00	0		43.86	5	84.8
Fulton Rd	9	26,589	30	8	0.11	23,398	1	55.00	1	217.4
White Ave	9	20,687	30	8	0.11	18,205	2	47.91	3	111.5
Arrow Hwy	9	4,545	30	4	0.11	2,000		13.60		12.7
E Street	3	2,273	30	4	0.34	3,091		7.01		5.9
D Street	NA	11,363	30	4	0.00	0		30.75	8	39.8
TOTALS:						**219,143**		**677.78**		2252.0
LA VERNE TRANSFER STATION TO IRWINDALE TRANSFER STATION - SEGMENT 7										
San Dimas Cyn Rd	9	0	40	4	0.11	0		0.00		0.0
Walnut Ave	9A	341	40	4	0.11	150		0.61		0.7
San Dimas Ave	9	341	40	4	0.11	150		0.61		0.7
Cataract Ave	9A	341	40	4	0.11	150		0.61		0.7
Lone Hill Ave	9	909	40	4	0.11	400		1.61		1.8
Valley Center Ave	9	6,113	40	4	0.11	2,690	7	10.08	8	14.1
Sunflower Ave	9A	9,817	40	4	0.11	4,320	5	15.33	6	25.7
Covina Blvd	9A	7,954	40	4	0.11	3,500	6	12.77	7	19.5
Bonnie Cove Ave	9	330	40	4	0.11	145		0.59		0.6
Cypress St	8	1,704	40	4	0.20	1,364	10	2.99	10	3.5
Glendora Ave	8	216	40	4	0.20	173		0.39		0.4
Grand Ave	9	4,772	40	4	0.11	2,100	9	8.02	9	10.6
Barranca Ave	8	20,453	30	4	0.20	16,362	1	47.56	2	108.7
Citrus Ave	9	5,386	30	4	0.11	2,370	8	15.92	5	15.4
Hollenbeck Ave	8	17,044	30	4	0.20	13,635	2	42.07	3	75.9
Azusa Ave	9	29,316	30	4	0.11	12,899	3	57.30	1	314.9

2005 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Lark Ellen Ave	9	909	30	4	0.11	400		2.86		2.3
Vincent Ave	9A	909	30	4	0.11	400		2.86		2.3
Irwindale Ave	8	14,128	30	4	0.20	11,303	4	36.60	4	55.2
TOTALS:						**72,509**		**258.78**		653.1
IRWINDALE TRANSFER STATION TO BASSETT JUNCTION - SEGMENT 8										
Cypress St	NA	45	20	4	0.00	0	3	0.32	3	0.2
Ramon Bl/Dowling Ave.	9	45	20	4	0.11	20	1	0.32	1	0.2
Pacific Ave	NA	45	20	4	0.00	0	4	0.32	4	0.2
MacDevitt St	NA	45	20	4	0.00	0	5	0.32	5	0.2
Merced Ave	NA	45	20	4	0.00	0	6	0.32	6	0.2
Francisquito Ave	9	45	20	4	0.11	20	2	0.32	2	0.2
Dalewood St	NA	45	20	4	0.00	0	7	0.32	7	0.2
Amar Rd	NA	45	20	4	0.00	0	8	0.32	8	0.2
TOTALS:						**40**		**2.60**		1.3

2010 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
EAGLE MOUNTAIN TO FERRUM - Segment 1A										
NO CROSSINGS										
FERRUM TO COLTON YARD - Segment 1B										
Parkside Dr.	8	879	15	42	0.20	7,383		11.02	10	4.1
Bay Dr.	9	1,789	15	42	0.11	8,265		22.16	4	8.5
Cleveland St.	9	194	35	42	0.11	896		0.45		0.4
Hammond Rd.	9	1,042	35	42	0.11	4,813		2.40		2.3
66th Av.	9	10,181	35	42	0.11	47,035	5	20.63	6	30.1
62nd Av.	9	1,593	35	42	0.11	7,357		3.65		3.6
58th Av.	8	2,050	35	42	0.20	17,221		4.67		4.7
Airport Blvd.	9	14,930	35	42	0.11	68,976	3	28.08	3	53.2
Av. 54	GS	0	35	42	0.00	0		0.00		0.0
52nd Av.	9	3,221	35	42	0.11	14,882		7.22		7.6
5th St.	8	667	35	42	0.20	5,603		1.55		1.5
50th Av.	8	3,699	35	42	0.20	31,076	9	8.24		8.9
Dillon Rd.	9	18,865	35	42	0.11	87,154	1	33.19	1	81.0
South Indio Oh	GS	0	35	42	0.00	0		0.00		0.0
Jackson St. SR 10	GS	54,246	35	42	0.00	0		0.00		-274.3
Monroe St. Oh	GS	0	35	42	0.00	0		0.00		0.0
Monroe St.	GS	24,141	35	42	0.00	0		0.00		143.1
Indio Oh St. 10	GS	0	35	42	0.00	0		0.00		0.0
Washington St. DVHD	GS	9,206	35	42	0.00	0		0.00		26.3
Monterey Av.	GS	0	35	42	0.00	0		0.00		0.0
Ramon Rd. Oh	GS	17,272	35	42	0.00	0		0.00		68.5
Date Palm Dr. Oh	GS	11,481	35	42	0.00	0		0.00		35.6
Palm Dr. Oh	GS	14,539	35	42	0.00	0		0.00		50.9
Indian Av. Oh	GS	14,963	35	42	0.00	0		0.00		53.4
Tipton Rd.	9	292	35	42	0.11	1,350		0.68		0.6
Palm Spr OVH St. 111	GS	0	35	42	0.00	0		0.00		0.0
Broadway	9	4,847	35	42	0.11	22,395	10	10.62		12.0
Apache Trail	9	9,824	35	42	0.11	45,387	6	20.02	7	28.6
Hargreave St.	9	9,790	35	42	0.11	45,231	7	19.96	8	28.5
San Gorgonio Av.	9A	9,596	35	42	0.11	44,336	8	19.62	9	27.8
Eight St.	GS	0	35	42	0.00	0		0.00		0.0
22nd St.	9	18,438	35	42	0.11	85,184	2	32.68	2	77.4
North Sunset Av.	9A	1,724	35	42	0.11	7,967		3.94		3.9
Highland Springs Av.	9	747	35	42	0.11	3,452		1.73		1.6
Pennsylvania Av.	9	1,626	35	42	0.11	7,513		3.72		3.7
Beaumont Av. St. 79	9	11,060	35	42	0.11	51,096	4	22.12	5	33.7
California Av.	9	3,741	35	42	0.11	17,283		8.32		9.0
Veile Av.	8	1,300	35	42	0.20	10,923		2.99		2.9
Beaumont Oh St. 60	GS	14,555	35	42	0.00	0		0.00		51.0
San Timoteo Cyn Rd.	9	1,171	35	42	0.11	5,411		2.70		2.6
Live Oak Cyn Rd.	9	2,505	35	42	0.11	11,574		5.67		5.8
Allesandro Rd.	9	2,141	35	42	0.11	9,890		4.87		4.9
San Timateo Cyn Rd.	9	0	35	42	0.11	0		0.00		0.0
Beaumont Av.	9	835	35	42	0.11	3,858		1.93		1.8
Whittier Av.	9	489	35	42	0.11	2,257		1.14		1.1
Barton Rd. Oh	GS	0	35	42	0.00	0		0.00		0.0
Mountain View Av.	GS	0	35	42	0.00	0		0.00		0.0
Anderson St. Oh	GS	0	15	42	0.00	0		0.00		0.0
Waterman Av.	GS	0	15	42	0.00	0		0.00		0.0
Hunts Ln.	GS	0	15	42	0.00	0		0.00		0.0
Colton Loma Linda Yd	GS	0	15	42	0.00	0		0.00		0.0
Colton St. 15	GS	0	15	42	0.00	0		0.00		0.0
So. East Conn. Oh	GS	0	15	42	0.00	0		0.00		0.0
Mount Vernon Av.	GS	0	15	42	0.00	0		0.00		0.0

2010 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
TOTALS:						**675,765**		**305.98**		606.1
COLTON YARD TO INDUSTRY TRANSFER YARD - Segment 2										
Colton Yard	GS	0	15	43	0.00	0		0.00		0.0
La Cadena Dr. Up	GS	0	15	43	0.00	0		0.00		0.0
Rancho Av. Oh	GS	0	15	43	0.00	0		0.00		0.0
Pepper Av. Oh	GS	4,496	15	43	0.00	0		0.00		23.0
Riverside Av. Oh	GS	32,067	40	43	0.00	0		0.00		398.8
Cedar Av. Oh	GS	46,454	40	43	0.00	0		0.00		-405.4
Sierra Av. Oh	GS	52,447	40	43	0.00	0		0.00		-267.9
Citrus Av. Oh	GS	18,880	40	43	0.00	0		0.00		72.9
Cherry Av. Oh	GS	11,388	40	43	0.00	0		0.00		31.6
Etiwanda Av.	GS	29,071	40	43	0.00	0		0.00		240.2
Vina Vista Oh	GS	0	40	43	0.00	0		0.00		0.0
Milliken Av.	9	31,168	40	43	0.11	147,424	2	32.98	2	336.6
Haven Av.	GS	0	40	43	0.00	0		0.00		0.0
Turner Av.	9	2,397	40	43	0.11	11,336		4.16		5.0
Archibald Av.	9	10,191	40	43	0.11	48,204		15.83		27.0
Vineyard Av.	9	26,972	40	43	0.11	127,577	4	31.21	4	180.5
Grove Av. Up	GS	0	40	43	0.00	0		0.00		0.0
Bon View Av.	9	21,279	40	43	0.11	100,651	6	27.48	6	93.9
Campus Av.	9	15,884	40	43	0.11	75,130		22.54		53.0
Sultana Av.	9	10,488	40	43	0.11	49,610		16.22		28.1
Euclid Av. Up	GS	0	40	43	0.00	0		0.00		0.0
Euclid Av. State 83	9	65,934	40	43	0.11	311,869	1	15.66		-174.2
Vine Av.	9	13,787	40	43	0.11	65,213		20.24		42.0
San Antonio Av.	9	12,887	40	43	0.11	60,958		19.20		37.9
Mountain Av. Oh	GS	0	40	43	0.00	0		0.00		0.0
Central Av. Oh	GS	0	40	43	0.00	0		0.00		0.0
Monte Vista Av.	9	15,584	40	43	0.11	73,712		22.22		51.3
Co Rd. Ramona Av.	9	22,228	40	43	0.11	105,138	5	28.21	5	104.0
East End Av.	9	19,071	40	43	0.11	90,208	7	25.62	7	74.3
Reservoir Av.	9	17,670	40	43	0.11	83,580	9	24.33	9	64.1
San Antonio Av.	9	18,655	40	43	0.11	88,239	8	25.25	8	71.2
Towne Av.	GS	0	40	43	0.00	0		0.00		0.0
Palamores St.	9	15,615	40	43	0.11	73,859		22.25		51.5
Garey Av.	GS	0	40	43	0.00	0		0.00		0.0
Main St.	9	8,748	40	43	0.11	41,380		13.89		22.1
Park Av.	9	17,148	40	43	0.11	81,110	10	23.82	10	60.7
White Av.	GS	0	40	43	0.00	0		0.00		0.0
Hamilton Bl.	9	27,608	40	43	0.11	130,585	3	31.53	3	196.0
State St. 71	GS	0	40	43	0.00	0		0.00		0.0
Humane Way	GS	0	40	43	0.00	0		0.00		0.0
Omar Oh	GS	0	40	43	0.00	0		0.00		0.0
Temple Av.	9	137	40	43	0.11	648		0.25		0.3
Pomona Bl.	9	10,000	40	43	0.11	47,299		15.58		26.4
Brea Canyon Rd.	9	10,886	40	43	0.11	51,493		16.73		29.6
Lemon Rd.	9	5,719	40	43	0.11	27,049		9.49		13.1
Fairway Dr.	9	0	40	43	0.11	0		0.00		0.0
Nogales Av.	9	6,411	15	43	0.11	30,326		74.47	1	34.8
Fullerton Rd.	GS	0	15	43	0.00	0		0.00		0.0
Azusa Av. Oh	GS	8,231	15	43	0.00	0		0.00		47.4
TOTALS:						**1,922,597**		**539.14**		1569.7
INUSTRY TRANSFER STATION TO BASSETT JUNCTION - SEGMENT 3										
Brea Canyon	9	25,346	60	28	0.11	78,066	4	13.53	3	108.7
Lemon	9	20,064	60	28	0.11	61,798	5	11.82	4	60.7
Fairway	9	839	60	28	0.11	2,583	9	0.66	8	1.2

2010 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Nogales	9	78,710	60	28	0.11	242,428	1	-2.25	9	-105.0
California	9	15,224	60	28	0.11	46,889	7	9.75	6	36.3
Sunset	9	44,505	60	28	0.11	137,076	2	14.77	2	-371.4
Orange	9	10,097	60	28	0.11	31,100	8	7.01	7	19.6
Puente	9	41,934	60	28	0.11	129,156	3	15.05	1	-578.7
Vineland	9	16,715	60	28	0.11	51,483	6	10.44	5	42.6
TOTALS:						**780,579**		**80.78**		-785.8
BASSETT JUNCTION TO SOUTHERN PACIFIC LA TRANSPORTATION CENTER - SEGMENT 4										
Temple	9	49,612	60	28	0.11	152,806	7	13.79		-231.9
Cogswell	9	15,552	50	28	0.11	47,899		14.23		43.0
Peck	9	85,728	40	28	0.11	264,042	2	-19.68		-132.5
Ramona	9	86,089	30	28	0.11	265,154	1	-36.36		-167.0
Cypress	9	10,275	30	28	0.11	31,647		28.27	7	34.6
Tyler	9	36,019	30	28	0.11	110,937		60.29	2	1695.8
Arden	9	33,880	35	28	0.11	104,351		43.94	5	675.5
Baldwin	9	64,675	40	28	0.11	199,199	4	17.29		-178.9
Temple City	9	55,541	45	28	0.11	171,067	5	21.21		-213.0
Lower Azusa	9	30,548	50	28	0.11	94,087		21.02		254.5
Encinita	9	14,441	50	28	0.11	44,477		13.46		38.1
Walnut Grove	9	12,511	50	28	0.11	38,533		12.02		30.5
San Gabriel	9	84,881	50	28	0.11	261,433	3	-11.41		-112.4
Del Mar	9	36,863	50	28	0.11	113,537	10	21.84	8	2012.4
Mission	9	40,309	50	28	0.11	124,152	9	21.78	9	-1083.8
Ramona	9	44,011	50	28	0.11	135,554	8	21.31	10	-454.6
Valley	9	54,175	25	28	0.11	166,859	6	71.21	1	-364.7
Boca	NA	16,107	25	28	0.00	0		58.10	3	80.1
Vineburn	NA	5,604	20	28	0.00	0		37.08	6	22.9
San Pablo	NA	8,331	20	28	0.00	0		52.99	4	37.2
TOTALS:						**2,325,734**		**462.37**		1985.6
SP LA TRANSPORTATION CENTER TO NORTHERN ORANGE CO - SEGMENT 5										
Washington Blvd	NA	67,066	10	20	0.00	0		224.79	7	-575.3
Santa Fe Ave	NA	42,489	10	20	0.00	0		534.18	2	-2359.8
25th St	NA	12,497	10	20	0.00	0		297.73	6	122.2
E. Alameda st	NA	22,217	10	20	0.00	0		448.28	4	350.9
41st Street	4	27,548	10	24	0.34	224,795	4	500.76	3	657.2
Vernon Ave	4	33,602	10	4	0.34	45,699		534.49	1	1905.1
51st Street	4	555	10	2	0.34	378		15.72		3.7
55th Street	8	17,190	10	28	0.20	96,264		379.27	5	206.0
Slauson Ave	8	78,591	10	28	0.20	440,109	1	-76.39		-482.7
Randolph St	8	18,717	20	28	0.20	104,817	10	100.78		128.4
Gage Ave	9	47,488	20	28	0.11	146,262	7	127.27		-662.2
Florence Ave	9	73,065	20	20	0.11	160,742	6	20.16		-275.7
Nadeau st	9	34,713	20	20	0.11	76,369		134.71		1397.3
Santa Fe Ave	9	24,716	15	10	0.11	27,187		211.58	9	318.7
Long Beach Blvd	9	50,820	15	30	0.11	167,707	5	213.60	8	-679.1
State St	9	33,325	20	10	0.11	36,657		133.68		943.0
California Ave	9	30,548	20	10	0.11	33,602		130.51		542.3
San Juan Ave	9	8,331	20	6	0.11	5,499		52.99		37.2
Otis Ave	9	33,325	20	10	0.11	36,657		133.68		943.0
Atlantic Ave	9	69,427	20	10	0.11	76,369		42.90		-292.3
Garfield Ave	9	66,927	20	4	0.11	29,448		57.08		-306.1
Firestone Blvd	9	119,691	20	6	0.11	78,996		491.55		-193.8
Rives Ave	9	22,217	20	6	0.11	14,663		112.31		186.2
Paramount Bvlvd	9	68,593	20	2	0.11	15,091		47.75		-296.6
Downey Ave	9	26,354	20	6	0.11	17,394		122.98		299.4
Dolan Ave	9	1,000	20	12	0.11	1,320		7.05		3.6

2010 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Brookshire Ave	9	23,605	20	12	0.11	31,159		116.25		216.9
Patton Rd	9	22,217	20	12	0.11	29,326		112.31		186.2
Lakewood Blvd	9	94,420	20	30	0.11	311,586	2	-163.48		-221.4
Woodruff Ave	9	38,879	20	30	0.11	128,300	8	135.66	10	-5852.5
Stewart & Gray Rd	9	23,327	20	10	0.11	25,660		115.49		210.3
Regent View Ave	9	6,665	20	10	0.11	7,331		43.44		28.1
Hoxie Ave	8A	278	20	6	0.11	183		1.98		1.0
Studebaker Rd	8	33,936	20	6	0.20	40,723		134.18		1104.7
Orr & Day Rd	8	69	20	4	0.20	56		0.50		0.2
Pioneer Blvd	9	41,517	20	6	0.11	27,401		134.57		-1561.7
San Antonio Blvd	9	48,876	20	6	0.11	32,258		124.61		-594.5
Funston Ave	8	9,164	20	6	0.20	10,997		57.57		42.0
Rosecrans Ave	9	77,758	20	6	0.11	51,320		-12.85		-258.7
Bloomfield Ave	9	19,439	20	6	0.11	12,830		103.35		138.6
Shoemaker Ave	9	1,264	20	4	0.11	556		8.88		4.6
Carmenita Rd	8	8,331	20	6	0.20	9,997		52.99		37.2
Alondra Blvd	9	11,108	20	10	0.11	12,219		67.76		54.6
Marquardt Ave	9A	833	20	4	0.11	367		5.89		3.0
Valley View Ave	9	5,554	20	10	0.11	6,110		36.78		22.6
Artesia Blvd	9	69,427	20	12	0.11	91,643		42.90		-292.3
Knott Ave	9	55,541	20	12	0.11	73,314		106.81		-418.9
Western Ave	9A	41,656	20	12	0.11	54,986		134.47		-1507.4
Beach Blvd	9	94,420	20	30	0.11	311,586	3	-163.48		-221.4
Stanton Ave	9	32,214	20	30	0.11	106,306	9	132.58		736.6
TOTALS:						**3,212,243**		**5345.45**		**######**
COLTON YARD TO LA VERNE TRANSFER STATION - SEGMENT 6										
Meridian Ave	NA	1,666	50	2	0.00	0		1.87		2.8
Pepper Ave	8	27,771	50	2	0.20	11,108	7	20.27	9	168.5
Eucalyptus Ave	3	5,554	50	2	0.34	3,777		5.92		10.6
Acacia Ave	9	8,331	60	2	0.11	1,833		5.94		15.2
Sycamore Ave	3	9,720	60	2	0.34	6,609		6.79		18.7
Date Ave	3	555	60	2	0.34	378		0.44		0.8
Olive Ave	3	555	60	2	0.34	378		0.44		0.8
Riverside Ave	9	33,325	60	2	0.11	7,331		14.98		386.9
Orange Ave	3	555	60	2	0.34	378		0.44		0.8
Palm Ave	3	1,389	60	2	0.34	944		1.09		2.1
Willow Ave	9	5,554	60	2	0.11	1,222		4.12		9.3
Lilac Ave	9	4,721	60	2	0.11	1,039		3.55		7.7
Cactus Ave	9	6,943	60	2	0.11	1,527		5.05		12.1
Cedar Ave	9	6,943	60	2	0.11	1,527		5.05		12.1
Linden Ave	3	1,944	60	2	0.34	1,322		1.52		2.9
Maple Ave	3	1,389	60	2	0.34	944		1.09		2.1
Locust Ave	3	6,665	60	2	0.34	4,532		4.87		11.5
Laurel Ave	3	1,872	60	2	0.34	1,273		1.46		2.8
Alder Ave	9A	11,386	60	2	0.11	2,505		7.75		23.2
Tamarind Ave	3	4,721	60	2	0.34	3,210		3.55		7.7
Palmetto Ave	3	8,053	60	2	0.34	5,476		5.76		14.6
Mango Ave	8	16,662	60	2	0.20	6,665		10.42		42.4
Sierra Ave	8	34,158	60	2	0.20	13,663	6	15.06		482.6
Juniper Ave	9	14,441	50	2	0.11	3,177		13.46		38.1
Cypress Ave	3	6,943	50	2	0.34	4,721		7.26		13.9
Oleander Ave	3	6,943	50	2	0.34	4,721		7.26		13.9
Citrus Ave	9A	8,331	50	2	0.11	1,833		8.53		17.4
Tokay Ave	NA	972	50	2	0.00	0		1.10		1.6
Almeria Ave	NA	417	50	2	0.00	0		0.48		0.7
Sultana Ave	NA	56	50	2	0.00	0		0.06		0.1
Hemlock Ave	NA	278	50	2	0.00	0		0.32		0.5

2010 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Miller Ave	NA	694	50	2	0.00	0		0.79		1.2
Redwood Ave	NA	694	50	2	0.00	0		0.79		1.2
Base Line St	NA	2,777	50	2	0.00	0		3.08		4.9
East Ave	3	1,666	50	2	0.34	1,133		1.87		2.8
Etiwanda Ave	9	6,943	50	2	0.11	1,527		7.26		13.9
Milliken Ave	9	13,885	50	2	0.11	3,055		13.06		35.7
Haven Ave	9	20,550	50	2	0.11	4,521		17.25		73.1
Hermosa Ave	3	1,666	50	2	0.34	1,133		1.87		2.8
Ramona Ave	3	555	50	2	0.34	378		0.63		0.9
Archibald Ave	9	9,442	50	2	0.11	2,077		9.51		20.5
Amethyst Ave	3	6,665	50	2	0.34	4,532		7.00		13.2
Base Line St	9	22,217	50	2	0.11	4,888		18.09		87.4
Hellman Ave	3	6,943	50	2	0.34	4,721		7.26		13.9
Grove Ave	9A	24,438	50	2	0.11	5,376		19.07	10	111.9
11th St	NA	1,666	50	2	0.00	0		1.87		2.8
10th St	NA	1,666	50	2	0.00	0		1.87		2.8
9th St	NA	1,666	50	2	0.00	0		1.87		2.8
8th St	NA	1,666	50	2	0.00	0		1.87		2.8
Campus Ave	3	13,330	50	2	0.34	9,064	8	12.65		33.5
6th St	3	1,666	50	2	0.34	1,133		1.87		2.8
3rd St	3	6,943	50	2	0.34	4,721		7.26		13.9
2nd St	3	5,276	50	2	0.34	3,588		5.65		10.0
1st St	3	2,777	50	2	0.34	1,888		3.08		4.9
Euclid Ave	9	68,316	50	2	0.11	15,029	3	7.95		-139.9
Laurel Ave	NA	1,389	50	2	0.00	0		1.57		2.4
Palm Ave	NA	1,389	50	2	0.00	0		1.57		2.4
San Antonio Ave	3	20,550	50	2	0.34	13,974	5	17.25		73.1
Mountain Ave	9	37,213	40	2	0.11	8,187	10	34.07	7	3487.4
Benson Ave	NA	9,720	40	2	0.00	0		15.20		25.4
Central Ave	9A	38,879	40	2	0.11	8,553	9	34.06	8	-3264.1
Claremont Blvd	9	0	30	2	0.11	0		0.00		0.0
Towne Ave	9	22,108	30	2	0.11	4,864		49.88	4	129.8
Garey Ave	9	32,492	30	4	0.11	14,296	4	59.19	2	550.3
Pine St	NA	22,108	30	28	0.00	0		49.88	5	129.8
Fulton Rd	9	32,492	30	8	0.11	28,593	1	59.19	1	550.3
White Ave	9	25,280	30	8	0.11	22,246	2	53.68	3	185.4
Arrow Hwy	9	5,554	30	4	0.11	2,444		16.38		16.0
E Street	3	2,777	30	4	0.34	3,777		8.51		7.4
D Street	NA	13,885	30	4	0.00	0		36.11	6	53.7
TOTALS:						**267,793**		**755.93**		3593.7
LA VERNE TRANSFER STATION TO IRWINDALE TRANSFER STATION - SEGMENT 7										
San Dimas Cyn Rd	9	0	40	4	0.11	0		0.00		0.0
Walnut Ave	9A	417	40	4	0.11	183		0.74		0.8
San Dimas Ave	9	417	40	4	0.11	183		0.74		0.8
Cataract Ave	9A	417	40	4	0.11	183		0.74		0.8
Lone Hill Ave	9	1,111	40	4	0.11	489		1.96		2.2
Valley Center Ave	9	7,470	40	4	0.11	3,287	7	12.08	8	18.1
Sunflower Ave	9A	11,997	40	4	0.11	5,279	5	18.12	6	34.0
Covina Blvd	9A	9,720	40	4	0.11	4,277	6	15.20	7	25.4
Bonnie Cove Ave	9	403	40	4	0.11	177		0.72		0.8
Cypress St	8	2,083	40	4	0.20	1,666	10	3.63	10	4.3
Glendora Ave	8	264	40	4	0.20	211		0.47		0.5
Grand Ave	9	5,832	40	4	0.11	2,566	9	9.66	9	13.4
Barranca Ave	8	24,994	30	4	0.20	19,995	1	53.37	2	179.3
Citrus Ave	9	6,582	30	4	0.11	2,896	8	19.13	5	19.5
Hollenbeck Ave	8	20,828	30	4	0.20	16,662	2	48.11	3	113.2
Azusa Ave	9	35,824	30	4	0.11	15,763	3	60.26	1	1536.0

2010 BASE

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Lark Ellen Ave	9	1,111	30	4	0.11	489		3.48		2.8
Vincent Ave	9A	1,111	30	4	0.11	489		3.48		2.8
Irwindale Ave	8	17,265	30	4	0.20	13,812	4	42.46	4	77.7
TOTALS:						**88,607**		**294.37**		2032.3
IRWINDALE TRANSFER STATION TO BASSETT JUNCTION - SEGMENT 8										
Cypress St	NA	56	20	4	0.00	0	3	0.40	3	0.2
Ramon Bl/Dowling Ave.	9	56	20	4	0.11	24	1	0.40	1	0.2
Pacific Ave	NA	56	20	4	0.00	0	4	0.40	4	0.2
MacDevitt St	NA	56	20	4	0.00	0	5	0.40	5	0.2
Merced Ave	NA	56	20	4	0.00	0	6	0.40	6	0.2
Francisquito Ave	9	56	20	4	0.11	24	2	0.40	2	0.2
Dalewood St	NA	56	20	4	0.00	0	7	0.40	7	0.2
Amar Rd	NA	56	20	4	0.00	0	8	0.40	8	0.2
TOTALS:						**49**		**3.17**		1.5

APPENDIX E
Future Conditions Without the Project Traffic Operations Analysis Worksheets

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... KAISER RD N/O DESERT CTR RICE RD
ANALYST..... RPH
TIME OF ANALYSIS..... 2000 BASE
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 20BAKRDC.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	31.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	4
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	43 / 57
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	4
PERCENT NO PASSING ZONES.....	20

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	.92	.71	.74
B	2.2	2	2.5	.92	.71	.7
C	2.2	2	2.5	.92	.71	.7
D	2	1.6	1.6	.92	.71	.75
E	2	1.6	1.6	.97	.71	.75

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 48
ACTUAL FLOW RATE: 48

LOS	SERVICE FLOW RATE	V/C
A	161	.12
B	306	.24
C	497	.39
D	849	.62
E	1443	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... EAGLE MTN RD N/O RAGSDALE RD
ANALYST..... RPH
TIME OF ANALYSIS..... 2000 BASE
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 20BAEMRR.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	12.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	50 / 50
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	8
PERCENT NO PASSING ZONES.....	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	1	.89
B	2.2	2	2.5	1	1	.87
C	2.2	2	2.5	1	1	.87
D	2	1.6	1.6	1	1	.89
E	2	1.6	1.6	1	1	.89

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 7
ACTUAL FLOW RATE: 7

LOS	SERVICE FLOW RATE	V/C
A	374	.15
B	659	.27
C	1050	.43
D	1597	.64
E	2496	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... KAISER RD N/O LAKE TAMARISK DR
ANALYST..... RPH
TIME OF ANALYSIS..... 2000 BASE
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 20BAKRLT.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	31.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	4
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	40 / 60
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	4
PERCENT NO PASSING ZONES.....	20

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	.92	.94	.74
B	2.2	2	2.5	.92	.94	.7
C	2.2	2	2.5	.92	.94	.7
D	2	1.6	1.6	.92	.94	.75
E	2	1.6	1.6	.97	.94	.75

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 31
ACTUAL FLOW RATE: 31

LOS	SERVICE FLOW RATE	V/C
A	214	.12
B	405	.24
C	658	.39
D	1124	.62
E	1911	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... EAGLE MTN RD N/O RAGSDALE RD
ANALYST..... RPH
TIME OF ANALYSIS..... 2005 BASE
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 25BAEMRR.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	12.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	50 / 50
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	8
PERCENT NO PASSING ZONES.....	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	1	.89
B	2.2	2	2.5	1	1	.87
C	2.2	2	2.5	1	1	.87
D	2	1.6	1.6	1	1	.89
E	2	1.6	1.6	1	1	.89

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 8
ACTUAL FLOW RATE: 8

LOS	SERVICE FLOW RATE	V/C
A	374	.15
B	659	.27
C	1050	.43
D	1597	.64
E	2496	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... KAISER RD N/O DESERT CTR RICE RD
ANALYST..... RPH
TIME OF ANALYSIS..... 2005 BASE
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 25BAKRDC.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	31.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	4
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	43 / 57
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	4
PERCENT NO PASSING ZONES.....	20

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	.92	.96	.74
B	2.2	2	2.5	.92	.96	.7
C	2.2	2	2.5	.92	.96	.7
D	2	1.6	1.6	.92	.96	.75
E	2	1.6	1.6	.97	.96	.75

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 56
ACTUAL FLOW RATE: 56

LOS	SERVICE FLOW RATE	V/C
A	218	.12
B	413	.24
C	671	.39
D	1145	.62
E	1948	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... KAISER RD N/O LAKE TAMARISK DR
ANALYST..... RPH
TIME OF ANALYSIS..... 2005 BASE
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 25BAKRLT.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	31.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	4
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	40 / 60
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	4
PERCENT NO PASSING ZONES.....	20

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	.92	.94	.74
B	2.2	2	2.5	.92	.94	.7
C	2.2	2	2.5	.92	.94	.7
D	2	1.6	1.6	.92	.94	.75
E	2	1.6	1.6	.97	.94	.75

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 36
ACTUAL FLOW RATE: 36

LOS	SERVICE FLOW RATE	V/C
A	214	.12
B	405	.24
C	658	.39
D	1124	.62
E	1911	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... EAGLE MTN RD N/O RAGSDALE RD
ANALYST..... RPH
TIME OF ANALYSIS..... 2010 BASE
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 21BAEMRR.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	12.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	50 / 50
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	8
PERCENT NO PASSING ZONES.....	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	1	.89
B	2.2	2	2.5	1	1	.87
C	2.2	2	2.5	1	1	.87
D	2	1.6	1.6	1	1	.89
E	2	1.6	1.6	1	1	.89

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 10
ACTUAL FLOW RATE: 10

LOS	SERVICE FLOW RATE	V/C
A	374	.15
B	659	.27
C	1050	.43
D	1597	.64
E	2496	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... KAISER RD N/O DESERT CTR RICE RD
ANALYST..... RPH
TIME OF ANALYSIS..... 2010 BASE
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 21BAKRDC.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	31.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	4
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	43 / 57
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	4
PERCENT NO PASSING ZONES.....	20

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	.92	.96	.74
B	2.2	2	2.5	.92	.96	.7
C	2.2	2	2.5	.92	.96	.7
D	2	1.6	1.6	.92	.96	.75
E	2	1.6	1.6	.97	.96	.75

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 67
ACTUAL FLOW RATE: 67

LOS	SERVICE FLOW RATE	V/C
A	218	.12
B	413	.24
C	671	.39
D	1145	.62
E	1948	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... KAISER RD N/O LAKE TAMARISK DR
ANALYST..... RPH
TIME OF ANALYSIS..... 2010 BASE
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 21BAKRLT.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	31.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	4
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	40 / 60
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	4
PERCENT NO PASSING ZONES.....	20

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	.92	.94	.74
B	2.2	2	2.5	.92	.94	.7
C	2.2	2	2.5	.92	.94	.7
D	2	1.6	1.6	.92	.94	.75
E	2	1.6	1.6	.97	.94	.75

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 42
ACTUAL FLOW RATE: 42

LOS	SERVICE FLOW RATE	V/C
A	214	.12
B	405	.24
C	658	.39
D	1124	.62
E	1911	1

LOS FOR GIVEN CONDITIONS: A

****

File Name L12BSAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/18/95
Other Information..... 2000 AM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	0	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	0	0	0		1	4	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		0
Potential Capacity: (pcph)		1385
Movement Capacity: (pcph)		1385
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		0
Potential Capacity: (pcph)		1091
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1091
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		0
Potential Capacity: (pcph)		1059
Major LT, Minor TH Impedance Factor:		1.00
Adjusted Impedance Factor:		1.00
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1059

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	1	1059	1084	3.3	A	
EB T	4	1091				3.3

Intersection Delay = 3.3

****

File Name L12BSPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/18/95
Other Information..... 2000 PM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	0	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	3	0	0		6	3	3			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

****

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		0
Potential Capacity: (pcph)		1385
Movement Capacity: (pcph)		1385
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	3	
Potential Capacity: (pcph)	1709	
Movement Capacity: (pcph)	1709	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		3
Potential Capacity: (pcph)		1087
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1087
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		2
Potential Capacity: (pcph)		1056
Major LT, Minor TH Impedance Factor:		1.00
Adjusted Impedance Factor:		1.00
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1056

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	7	1056	1065	3.4	A	
EB T	3	1087				3.2
EB R	3	1385		2.6	A	

Intersection Delay = 2.6

****

File Name L22BSAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/18/95
Other Information..... 2000 AM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1	1
Stop/Yield			N			N						
Volumes	0	1			0	8				0	0	1
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	1	
Potential Capacity: (pcph)	1383	
Movement Capacity: (pcph)	1383	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		8
Potential Capacity: (pcph)		1699
Movement Capacity: (pcph)		1699
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	9	
Potential Capacity: (pcph)	1079	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1079	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	1	
Potential Capacity: (pcph)	1057	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1057	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB R	1	1383		2.6	A	

Intersection Delay = 0.3

****

File Name L22BSPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/18/95
Other Information..... 2000 PM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1	1
Stop/Yield			N			N						
Volumes	1	6			0	1				0	3	0
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	6	
Potential Capacity: (pcph)	1375	
Movement Capacity: (pcph)	1375	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		1
Potential Capacity: (pcph)		1712
Movement Capacity: (pcph)		1712
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	8	
Potential Capacity: (pcph)	1080	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1079	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	8	
Potential Capacity: (pcph)	1048	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1047	

****

Intersection Performance Summary

Movement		FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB	T	3	1079		3.3	A	3.3
							3.3
NB	L	1	1712		2.1	A	0.3

Intersection Delay = 1.1

****

File Name L32BSAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) Ragsdale Road
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/18/95
Other Information..... 2000 AM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	0	0	0	1>	0<	1
Stop/Yield			N			N						
Volumes		1	1	0	0					6		1
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0			0			0	
MC's (%)		0	0	0	0					0		0
SU/RV's (%)		0	0	0	0					0		0
CV's (%)		0	0	0	0					0		0
PCE's		1.1	1.1	1.1	1.1					1.1		1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

****

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	1	
Potential Capacity: (pcph)	1383	
Movement Capacity: (pcph)	1383	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	2	
Potential Capacity: (pcph)	1711	
Movement Capacity: (pcph)	1711	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	2	
Potential Capacity: (pcph)	1056	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1056	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB L	7	1056	1088	3.3	A	3.3
WB R	1	1383				

Intersection Delay = 2.6

****

File Name L32BSPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) Ragsdale Road
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/18/95
Other Information..... 2000 PM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	0	0	0	1>	0<	1
Stop/Yield			N			N						
Volumes		3	3	1	0					1		0
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0			0			0	
MC's (%)		0	0	0	0					0		0
SU/RV's (%)		0	0	0	0					0		0
CV's (%)		0	0	0	0					0		0
PCE's		1.1	1.1	1.1	1.1					1.1		1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	3	
Potential Capacity: (pcph)	1380	
Movement Capacity: (pcph)	1380	
Prob. of Queue-free State:	1.00	
Step 2: LT from Major Street	**SB**	**NB**
Conflicting Flows: (vph)	6	
Potential Capacity: (pcph)	1703	
Movement Capacity: (pcph)	1703	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	
Step 4: LT from Minor Street	**WB**	**EB**
Conflicting Flows: (vph)	4	
Potential Capacity: (pcph)	1053	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1052	

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB L	1	1052	1052	3.4	A	
SB L	1	1703		2.1	A	2.1

Intersection Delay = 0.7

****

File Name L32BSPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) Ragsdale Road
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/18/95
Other Information..... 2000 PM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	0	0	0	1>	0<	1
Stop/Yield			N			N						
Volumes		3	3	1	0					1		0
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0			0			0	
MC's (%)		0	0	0	0					0		0
SU/RV's (%)		0	0	0	0					0		0
CV's (%)		0	0	0	0					0		0
PCE's		1.1	1.1	1.1	1.1					1.1		1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	3	
Potential Capacity: (pcph)	1380	
Movement Capacity: (pcph)	1380	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	6	
Potential Capacity: (pcph)	1703	
Movement Capacity: (pcph)	1703	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	4	
Potential Capacity: (pcph)	1053	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1052	

****

Intersection Performance Summary

Movement		FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB	L	1	1052	1052	3.4	A	
SB	L	1	1703		2.1	A	2.1

Intersection Delay = 0.7

****

File Name L42BSAM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/18/95
Other Information..... 2000 AM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	0	20	1		55	1	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		1
Potential Capacity: (pcph)		1383
Movement Capacity: (pcph)		1383
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-free State:	0.99	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		21
Potential Capacity: (pcph)		1064
Capacity Adjustment Factor due to Impeding Movements		0.99
Movement Capacity: (pcph)		1050
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		21
Potential Capacity: (pcph)		1030
Major LT, Minor TH Impedance Factor:		0.99
Adjusted Impedance Factor:		0.99
Capacity Adjustment Factor due to Impeding Movements		0.99
Movement Capacity: (pcph)		1016

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	64	1016	1017	3.8	A	
EB T	1	1050				3.8
SB L	23	1714		2.1	A	2.0

Intersection Delay = 3.3

File Name L42BSPM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/18/95
Other Information..... 2000 PM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		1	0	17	1		46	1	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		1
Potential Capacity: (pcph)		1383
Movement Capacity: (pcph)		1383
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	1	
Potential Capacity: (pcph)	1712	
Movement Capacity: (pcph)	1712	
Prob. of Queue-free State:	0.99	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		19
Potential Capacity: (pcph)		1066
Capacity Adjustment Factor due to Impeding Movements		0.99
Movement Capacity: (pcph)		1054
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		19
Potential Capacity: (pcph)		1032
Major LT, Minor TH Impedance Factor:		0.99
Adjusted Impedance Factor:		0.99
Capacity Adjustment Factor due to Impeding Movements		0.99
Movement Capacity: (pcph)		1020

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	53	1020	1021	3.7	A	
EB T	1	1054				3.7
SB L	20	1712		2.1	A	2.0

Intersection Delay = 3.2

****

File Name L52BSAM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/18/95
Other Information..... 2000 AM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1<	1
Stop/Yield			N			N						
Volumes	0	0			18	51				1	1	17
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1385	
Movement Capacity: (pcph)	1385	
Prob. of Queue-free State:	0.99	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		69
Potential Capacity: (pcph)		1589
Movement Capacity: (pcph)		1589
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	69	
Potential Capacity: (pcph)	1004	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1004	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	18	
Potential Capacity: (pcph)	1034	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1034	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB L	1	1034				
WB T	1	1004	1341	2.7	A	2.7
WB R	20	1385				

Intersection Delay = 0.6

****

File Name L52BSPM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/18/95
Other Information..... 2000 PM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1<	1
Stop/Yield			N			N						
Volumes	0	43			15	64				0	3	23
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	43	
Potential Capacity: (pcph)	1317	
Movement Capacity: (pcph)	1317	
Prob. of Queue-free State:	0.98	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		79
Potential Capacity: (pcph)		1572
Movement Capacity: (pcph)		1572
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	122	
Potential Capacity: (pcph)	941	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	941	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	58	
Potential Capacity: (pcph)	980	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	980	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB T	3	941				2.9
WB R	26	1317	1265	2.9	A	

Intersection Delay = 0.5

****

File Name L15BSAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/30/95
Other Information..... 2005 AM Base Volumes
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	0	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	0	0	0		1	4	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		0
Potential Capacity: (pcph)		1385
Movement Capacity: (pcph)		1385
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		0
Potential Capacity: (pcph)		1091
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1091
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		0
Potential Capacity: (pcph)		1059
Major LT, Minor TH Impedance Factor:		1.00
Adjusted Impedance Factor:		1.00
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1059

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	1	1059	1084	3.3	A	
EB T	4	1091				3.3

Intersection Delay = 3.3

****

File Name L15BSPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/30/95
Other Information..... 2005 PM Base Volumes
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	0	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	3	0	0		7	3	3			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		0
Potential Capacity: (pcph)		1385
Movement Capacity: (pcph)		1385
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	3	
Potential Capacity: (pcph)	1709	
Movement Capacity: (pcph)	1709	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		3
Potential Capacity: (pcph)		1087
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1087
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		2
Potential Capacity: (pcph)		1056
Major LT, Minor TH Impedance Factor:		1.00
Adjusted Impedance Factor:		1.00
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1056

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	8	1056	1064	3.4	A	
EB T	3	1087				3.2
EB R	3	1385		2.6	A	

Intersection Delay = 2.6

****

File Name L25BSAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/30/95
Other Information..... 2005 AM Base Volumes
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1	1
Stop/Yield			N			N						
Volumes	0	1			0	8				0	0	1
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	1	
Potential Capacity: (pcph)	1383	
Movement Capacity: (pcph)	1383	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		8
Potential Capacity: (pcph)		1699
Movement Capacity: (pcph)		1699
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	9	
Potential Capacity: (pcph)	1079	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1079	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	1	
Potential Capacity: (pcph)	1057	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1057	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB R	1	1383		2.6	A	

Intersection Delay = 0.3

****

File Name L25BSPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/30/95
Other Information..... 2005 PM Base Volumes
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1	1
Stop/Yield			N			N						
Volumes	1	7			0	1				0	3	0
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	7	
Potential Capacity: (pcph)	1373	
Movement Capacity: (pcph)	1373	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		1
Potential Capacity: (pcph)		1712
Movement Capacity: (pcph)		1712
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	9	
Potential Capacity: (pcph)	1079	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1078	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	8	
Potential Capacity: (pcph)	1048	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1047	

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB T	3	1078		3.3	A	3.3
						3.3
NB L	1	1712		2.1	A	0.3

Intersection Delay = 1.0

****

File Name L35BSAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) Ragsdale Road
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/30/95
Other Information..... 2005 AM Base Volumes
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	0	0	0	1>	0<	1
Stop/Yield			N			N						
Volumes		1	1	0	0					7		1
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0			0			0	
MC's (%)		0	0	0	0					0		0
SU/RV's (%)		0	0	0	0					0		0
CV's (%)		0	0	0	0					0		0
PCE's		1.1	1.1	1.1	1.1					1.1		1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	1	
Potential Capacity: (pcph)	1383	
Movement Capacity: (pcph)	1383	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	2	
Potential Capacity: (pcph)	1711	
Movement Capacity: (pcph)	1711	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	2	
Potential Capacity: (pcph)	1056	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1056	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB L	8	1056	1084	3.3	A	3.3
WB R	1	1383				

Intersection Delay = 2.7

****

File Name L35BSPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) Ragsdale Road
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/30/95
Other Information..... 2005 PM Base Volumes
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	0	0	0	1>	0<	1
Stop/Yield			N			N						
Volumes		3	3	1	0					1		0
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0			0			0	
MC's (%)		0	0	0	0					0		0
SU/RV's (%)		0	0	0	0					0		0
CV's (%)		0	0	0	0					0		0
PCE's		1.1	1.1	1.1	1.1					1.1		1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	3	
Potential Capacity: (pcph)	1380	
Movement Capacity: (pcph)	1380	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	6	
Potential Capacity: (pcph)	1703	
Movement Capacity: (pcph)	1703	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	4	
Potential Capacity: (pcph)	1053	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1052	

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB L	1	1052	1052	3.4	A	
SB L	1	1703		2.1	A	2.1

Intersection Delay = 0.7

****

File Name L45BSAM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/30/95
Other Information..... 2005 AM Base Volumes
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	0	22	1		59	1	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

****

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		1
Potential Capacity: (pcph)		1383
Movement Capacity: (pcph)		1383
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-free State:	0.99	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		23
Potential Capacity: (pcph)		1061
Capacity Adjustment Factor due to Impeding Movements		0.99
Movement Capacity: (pcph)		1046
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		23
Potential Capacity: (pcph)		1027
Major LT, Minor TH Impedance Factor:		0.99
Adjusted Impedance Factor:		0.99
Capacity Adjustment Factor due to Impeding Movements		0.99
Movement Capacity: (pcph)		1012

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	68	1012	1012	3.8	A	
EB T	1	1046				3.8
SB L	25	1714		2.1	A	2.0

Intersection Delay = 3.3

****

File Name L45BSPM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/30/95
Other Information..... 2005 PM Base Volumes
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		1	0	18	1		50	1	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		1
Potential Capacity: (pcph)		1383
Movement Capacity: (pcph)		1383
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	1	
Potential Capacity: (pcph)	1712	
Movement Capacity: (pcph)	1712	
Prob. of Queue-free State:	0.99	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		20
Potential Capacity: (pcph)		1065
Capacity Adjustment Factor due to Impeding Movements		0.99
Movement Capacity: (pcph)		1052
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		20
Potential Capacity: (pcph)		1031
Major LT, Minor TH Impedance Factor:		0.99
Adjusted Impedance Factor:		0.99
Capacity Adjustment Factor due to Impeding Movements		0.99
Movement Capacity: (pcph)		1018

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	58	1018	1019	3.7	A	
EB T	1	1052				3.7
SB L	21	1712		2.1	A	2.0

Intersection Delay = 3.2

****

File Name L55BSAM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/30/95
Other Information..... 2005 AM Base Volumes
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1<	1
Stop/Yield			N			N						
Volumes	0	0			19	55				1	1	18
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1385	
Movement Capacity: (pcph)	1385	
Prob. of Queue-free State:	0.98	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		74
Potential Capacity: (pcph)		1581
Movement Capacity: (pcph)		1581
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	74	
Potential Capacity: (pcph)	998	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	998	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	18	
Potential Capacity: (pcph)	1034	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1034	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB L	1	1034				
WB T	1	998	1343	2.7	A	2.7
WB R	21	1385				

Intersection Delay = 0.6

****

File Name L55BSPM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 9/30/95
Other Information..... 2005 PM Base Volumes
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1<	1
Stop/Yield			N			N						
Volumes	0	47			17	69				0	3	25
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	47	
Potential Capacity: (pcph)	1311	
Movement Capacity: (pcph)	1311	
Prob. of Queue-free State:	0.98	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		86
Potential Capacity: (pcph)		1560
Movement Capacity: (pcph)		1560
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	133	
Potential Capacity: (pcph)	929	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	929	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	64	
Potential Capacity: (pcph)	972	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	972	

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB T	3	929				2.9
WB R	29	1311	1262	2.9	A	

Intersection Delay = 0.5

****

File Name L11BSAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 AM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	0	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	0	0	0		2	5	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		0
Potential Capacity: (pcph)		1385
Movement Capacity: (pcph)		1385
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		0
Potential Capacity: (pcph)		1091
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1091
Prob. of Queue-free State:		0.99

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		0
Potential Capacity: (pcph)		1059
Major LT, Minor TH Impedance Factor:		1.00
Adjusted Impedance Factor:		1.00
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1059

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	2	1059	1083	3.3	A	
EB T	6	1091				3.3

Intersection Delay = 3.3

****

File Name L11BSPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 PM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	0	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	3	0	0		8	3	3			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		0
Potential Capacity: (pcph)		1385
Movement Capacity: (pcph)		1385
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	3	
Potential Capacity: (pcph)	1709	
Movement Capacity: (pcph)	1709	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		3
Potential Capacity: (pcph)		1087
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1087
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		2
Potential Capacity: (pcph)		1056
Major LT, Minor TH Impedance Factor:		1.00
Adjusted Impedance Factor:		1.00
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		1056

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	9	1056	1064	3.4	A	
EB T	3	1087				3.3
EB R	3	1385		2.6	A	

Intersection Delay = 2.7

****

File Name L21BSAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 AM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1	1
Stop/Yield			N			N						
Volumes	0	2			0	10				0	0	2
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	2	
Potential Capacity: (pcph)	1381	
Movement Capacity: (pcph)	1381	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		10
Potential Capacity: (pcph)		1696
Movement Capacity: (pcph)		1696
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	12	
Potential Capacity: (pcph)	1075	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1075	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	2	
Potential Capacity: (pcph)	1056	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1056	

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB R	2	1381		2.6	A	

Intersection Delay = 0.4

****

File Name L21BSPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 PM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1	1
Stop/Yield			N			N						
Volumes	1	7			0	1				0	3	0
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	7	
Potential Capacity: (pcph)	1373	
Movement Capacity: (pcph)	1373	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		1
Potential Capacity: (pcph)		1712
Movement Capacity: (pcph)		1712
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	9	
Potential Capacity: (pcph)	1079	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1078	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	8	
Potential Capacity: (pcph)	1048	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1047	

Intersection Performance Summary

Movement		FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB	T	3	1078		3.3	A	3.3
							3.3
NB	L	1	1712		2.1	A	0.3

Intersection Delay = 1.0

****

File Name L31BSAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) Ragsdale Road
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 AM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	0	0	0	1>	0<	1
Stop/Yield			N			N						
Volumes		2	2	0	0					8		2
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0			0			0	
MC's (%)		0	0	0	0					0		0
SU/RV's (%)		0	0	0	0					0		0
CV's (%)		0	0	0	0					0		0
PCE's		1.1	1.1	1.1	1.1					1.1		1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	2	
Potential Capacity: (pcph)	1381	
Movement Capacity: (pcph)	1381	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	4	
Potential Capacity: (pcph)	1707	
Movement Capacity: (pcph)	1707	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	2	
Potential Capacity: (pcph)	1056	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1056	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB L	9	1056				
			1103	3.3	A	3.3
WB R	2	1381				

Intersection Delay = 2.4

****

File Name L31BSPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) Ragsdale Road
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 PM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	0	0	0	1>	0<	1
Stop/Yield			N			N						
Volumes		3	3	2	0					2		0
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0			0			0	
MC's (%)		0	0	0	0					0		0
SU/RV's (%)		0	0	0	0					0		0
CV's (%)		0	0	0	0					0		0
PCE's		1.1	1.1	1.1	1.1					1.1		1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	3	
Potential Capacity: (pcph)	1380	
Movement Capacity: (pcph)	1380	
Prob. of Queue-free State:	1.00	
Step 2: LT from Major Street	**SB**	**NB**
Conflicting Flows: (vph)	6	
Potential Capacity: (pcph)	1703	
Movement Capacity: (pcph)	1703	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	
Step 4: LT from Minor Street	**WB**	**EB**
Conflicting Flows: (vph)	4	
Potential Capacity: (pcph)	1053	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1052	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB L	2	1052	1052	3.4	A	
SB L	2	1703		2.1	A	2.1

Intersection Delay = 1.1

****

File Name L41BSAM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 AM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	0	26	2		70	2	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		2
Potential Capacity: (pcph)		1381
Movement Capacity: (pcph)		1381
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-free State:	0.98	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		28
Potential Capacity: (pcph)		1055
Capacity Adjustment Factor due to Impeding Movements		0.98
Movement Capacity: (pcph)		1037
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		28
Potential Capacity: (pcph)		1020
Major LT, Minor TH Impedance Factor:		0.98
Adjusted Impedance Factor:		0.98
Capacity Adjustment Factor due to Impeding Movements		0.98
Movement Capacity: (pcph)		1002

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	81	1002	1003	3.9	A	
EB T	2	1037				3.9
SB L	30	1714		2.1	A	2.0

Intersection Delay = 3.4

****

File Name L41BSPM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 PM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		2	0	21	2		59	2	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		2
Potential Capacity: (pcph)		1381
Movement Capacity: (pcph)		1381
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	2	
Potential Capacity: (pcph)	1711	
Movement Capacity: (pcph)	1711	
Prob. of Queue-free State:	0.99	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		25
Potential Capacity: (pcph)		1058
Capacity Adjustment Factor due to Impeding Movements		0.99
Movement Capacity: (pcph)		1043
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		25
Potential Capacity: (pcph)		1024
Major LT, Minor TH Impedance Factor:		0.99
Adjusted Impedance Factor:		0.99
Capacity Adjustment Factor due to Impeding Movements		0.99
Movement Capacity: (pcph)		1010

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	68	1010	1011	3.8	A	
EB T	2	1043				3.8
SB L	24	1711		2.1	A	1.9

Intersection Delay = 3.2

****

File Name L51BSAM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 AM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1<	1
Stop/Yield			N			N						
Volumes	0	0			23	65				2	2	21
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1385	
Movement Capacity: (pcph)	1385	
Prob. of Queue-free State:	0.98	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		88
Potential Capacity: (pcph)		1557
Movement Capacity: (pcph)		1557
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	88	
Potential Capacity: (pcph)	981	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	981	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	24	
Potential Capacity: (pcph)	1025	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	1025	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB L	2	1025				
WB T	2	981	1313	2.8	A	2.8
WB R	24	1385				

Intersection Delay = 0.6

****

File Name L51BSPM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 PM Base Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1<	1
Stop/Yield			N			N						
Volumes	0	55			20	81				0	3	29
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	55	
Potential Capacity: (pcph)	1299	
Movement Capacity: (pcph)	1299	
Prob. of Queue-free State:	0.97	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		101
Potential Capacity: (pcph)		1534
Movement Capacity: (pcph)		1534
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	156	
Potential Capacity: (pcph)	903	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	903	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	76	
Potential Capacity: (pcph)	957	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	957	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB T	3	903				3.0
WB R	34	1299	1254	3.0	A	

Intersection Delay = 0.5

APPENDIX F
Future Conditions With the Project
At-grade Crossing Analysis

APPENDIX F
Future Conditions With the Project At-grade Crossing Analysis

2000 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
EAGLE MOUNTAIN TO FERRUM - Segment 1A										
NO CROSSINGS										
FERRUM TO COLTON YARD - Segment 1B										
Parkside Dr.	8	409	15	44	0.20	3,595		5.16	10	1.9
Bay Dr.	9	832	15	44	0.11	4,025		10.43	5	3.8
Cleveland St.	9	90	35	44	0.11	436		0.21		0.2
Hammond Rd.	9	484	35	44	0.11	2,344		1.13		1.1
66th Av.	9	4,732	35	44	0.11	22,904	5	10.38	6	11.7
62nd Av.	9	740	35	44	0.11	3,583		1.72		1.6
58th Av.	8	953	35	44	0.20	8,386		2.20		2.1
Airport Blvd.	9	6,940	35	44	0.11	33,588	3	14.76	3	18.4
Av. 54	GS	0	35	44	0.00	0		0.00		0.0
52nd Av.	9	1,497	35	44	0.11	7,247		3.43		3.4
5th St.	8	310	35	44	0.20	2,728		0.72		0.7
50th Av.	8	1,720	35	44	0.20	15,132	9	3.93		3.9
Dillon Rd.	9	8,769	35	44	0.11	42,440	1	18.15	1	24.6
South Indio Oh	GS	0	35	44	0.00	0		0.00		0.0
Jackson St. SR 10	GS	25,215	35	44	0.00	0		0.00		162.0
Monroe St. Oh	GS	0	35	44	0.00	0		0.00		0.0
Monroe St.	GS	11,221	35	44	0.00	0		0.00		34.4
Indio Oh St. 10	GS	0	35	44	0.00	0		0.00		0.0
Washington St. DVHD	GS	4,279	35	44	0.00	0		0.00		10.4
Monterey Av.	GS	0	35	44	0.00	0		0.00		0.0
Ramon Rd. Oh	GS	8,028	35	44	0.00	0		0.00		22.0
Date Palm Dr. Oh	GS	5,337	35	44	0.00	0		0.00		13.4
Palm Dr. Oh	GS	6,758	35	44	0.00	0		0.00		17.8
Indian Av. Oh	GS	6,955	35	44	0.00	0		0.00		18.4
Tipton Rd.	9	136	35	44	0.11	657		0.32		0.3
Palm Spr OVH St. 111	GS	0	35	44	0.00	0		0.00		0.0
Broadway	9	2,253	35	44	0.11	10,905	10	5.12		5.2
Apache Trail	9	4,566	35	44	0.11	22,101	6	10.04	7	11.2
Hargreave St.	9	4,551	35	44	0.11	22,026	7	10.01	8	11.2
San Gorgonio Av.	9A	4,461	35	44	0.11	21,589	8	9.83	9	10.9
Eight St.	GS	0	35	44	0.00	0		0.00		0.0
22nd St.	9	8,570	35	44	0.11	41,480	2	17.79	2	23.9
North Sunset Av.	9A	802	35	44	0.11	3,879		1.86		1.8
Highland Springs Av.	9	347	35	44	0.11	1,681		0.81		0.8
Pennsylvania Av.	9	756	35	44	0.11	3,658		1.75		1.7
Beaumont Av. St. 79	9	5,141	35	44	0.11	24,881	4	11.22	4	12.9
California Av.	9	1,739	35	44	0.11	8,416		3.98		3.9
Veile Av.	8	604	35	44	0.20	5,319		1.40		1.3
Beaumont Oh St. 60	GS	6,765	35	44	0.00	0		0.00		17.8
San Timoteo Cyn Rd.	9	544	35	44	0.11	2,635		1.26		1.2
Live Oak Cyn Rd.	9	1,164	35	44	0.11	5,636		2.68		2.6
Allesandro Rd.	9	932	35	44	0.11	4,510		2.15		2.1
San Timoteo Cyn Rd.	9	0	35	44	0.11	0		0.00		0.0
Beaumont Av.	9	364	35	44	0.11	1,760		0.85		0.8
Whittier Av.	9	213	35	44	0.11	1,030		0.50		0.5
Barton Rd. Oh	GS	0	35	44	0.00	0		0.00		0.0
Mountain View Av.	GS	0	35	44	0.00	0		0.00		0.0
Anderson St. Oh	GS	0	15	44	0.00	0		0.00		0.0
Waterman Av.	GS	0	15	44	0.00	0		0.00		0.0
Hunts Ln.	GS	0	15	44	0.00	0		0.00		0.0
Colton Loma Linda Yd	GS	0	15	44	0.00	0		0.00		0.0
Colton St. 15	GS	0	15	44	0.00	0		0.00		0.0
So. East Conn. Oh	GS	0	15	44	0.00	0		0.00		0.0

2000 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Mount Vernon Av.	GS	0	15	44	0.00	0		0.00		0.0
TOTALS:						**328,572**		**153.80**		461.7
COLTON YARD TO INDUSTRY TRANSFER YARD - Segment 2										
Colton Yard	GS	0	15	45	0.00	0		0.00		0.0
La Cadena Dr. Up	GS	0	15	45	0.00	0		0.00		0.0
Rancho Av. Oh	GS	0	15	45	0.00	0		0.00		0.0
Pepper Av. Oh	GS	1,957	15	45	0.00	0		0.00		9.3
Riverside Av. Oh	GS	13,961	40	45	0.00	0		0.00		42.9
Cedar Av. Oh	GS	20,224	40	45	0.00	0		0.00		84.0
Sierra Av. Oh	GS	22,833	40	45	0.00	0		0.00		111.1
Citrus Av. Oh	GS	8,220	40	45	0.00	0		0.00		20.4
Cherry Av. Oh	GS	4,958	40	45	0.00	0		0.00		11.1
Etiwanda Av.	GS	12,656	40	45	0.00	0		0.00		36.8
Vina Vista Oh	GS	0	40	45	0.00	0		0.00		0.0
Milliken Av.	9	13,569	40	45	0.11	67,167	2	19.99	3	41.0
Haven Av.	GS	0	40	45	0.00	0		0.00		0.0
Turner Av.	9	1,043	40	45	0.11	5,165		1.85		2.1
Archibald Av.	9	4,437	40	45	0.11	21,962		7.49		9.8
Vineyard Av.	9	11,742	40	45	0.11	58,125	3	17.81	4	33.0
Grove Av. Up	GS	0	40	45	0.00	0		0.00		0.0
Bon View Av.	9	9,264	40	45	0.11	45,857	6	14.59	7	23.8
Campus Av.	9	6,915	40	45	0.11	34,230		11.27		16.4
Sultana Av.	9	4,566	40	45	0.11	22,603		7.70		10.1
Euclid Av. Up	GS	0	40	45	0.00	0		0.00		0.0
Euclid Av. State 83	9	28,705	40	45	0.11	142,090	1	32.04	1	227.9
Vine Av.	9	6,002	40	45	0.11	29,712		9.92		13.8
San Antonio Av.	9	5,611	40	45	0.11	27,773		9.32		12.8
Mountain Av. Oh	GS	0	40	45	0.00	0		0.00		0.0
Central Av. Oh	GS	0	40	45	0.00	0		0.00		0.0
Monte Vista Av.	9	6,785	40	45	0.11	33,584		11.08		16.0
Co Rd. Ramona Av.	9	9,677	40	45	0.11	47,902	5	15.15	6	25.2
East End Av.	9	7,738	40	45	0.11	38,301	7	12.47	8	18.9
Reservoir Av.	9	7,169	40	45	0.11	35,487	9	11.65	10	17.2
San Antonio Av.	9	7,569	40	45	0.11	37,465	8	12.22	9	18.4
Towne Av.	GS	0	40	45	0.00	0		0.00		0.0
Palamores St.	9	6,335	40	45	0.11	31,359		10.42		14.8
Garey Av.	GS	0	40	45	0.00	0		0.00		0.0
Main St.	9	3,549	40	45	0.11	17,569		6.07		7.6
Park Av.	9	6,957	40	45	0.11	34,438	10	11.34		16.5
White Av.	GS	0	40	45	0.00	0		0.00		0.0
Hamilton Bl.	9	11,201	40	45	0.11	55,444	4	17.13	5	30.8
State St. 71	GS	0	40	45	0.00	0		0.00		0.0
Humane Way	GS	0	40	45	0.00	0		0.00		0.0
Omar Oh	GS	0	40	45	0.00	0		0.00		0.0
Temple Av.	9	56	40	45	0.11	275		0.10		0.1
Pomona Bl.	9	4,057	40	45	0.11	20,082		6.89		8.8
Brea Canyon Rd.	9	4,417	40	45	0.11	21,863		7.46		9.7
Lemon Rd.	9	2,320	40	45	0.11	11,485		4.03		4.8
Fairway Dr.	9	0	40	45	0.11	0		0.00		0.0
Nogales Av.	9	2,601	15	45	0.11	12,876		31.87	2	12.6
Fullerton Rd.	GS	0	15	45	0.00	0		0.00		0.0
Azusa Av. Oh	GS	3,340	15	45	0.00	0		0.00		16.5
TOTALS:						**852,812**		**289.85**		924.0
INUSTRY TRANSFER STATION TO BASSETT JUNCTION - SEGMENT 3										
Brea Canyon	9	10,283	60	30	0.11	33,935	4	7.12	4	20.1

2000 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Lemon	9	8,140	60	30	0.11	26,863	5	5.82	5	14.8
Fairway	9	340	60	30	0.11	1,123	9	0.27	9	0.5
Nogales	9	31,934	60	30	0.11	105,382	1	14.82	1	285.8
California	9	6,177	60	30	0.11	20,383	7	4.54	7	10.5
Sunset	9	18,056	60	30	0.11	59,586	2	11.02	2	49.1
Orange	9	4,097	60	30	0.11	13,519	8	3.10	8	6.6
Puente	9	17,013	60	30	0.11	56,143	3	10.57	3	44.0
Vineland	9	6,782	60	30	0.11	22,379	6	4.95	6	11.8
TOTALS:						**339,312**		**62.22**		443.2
BASSETT JUNCTION TO SOUTHERN PACIFIC LA TRANSPORTATION CENTER - SEGMENT 4										
Temple	9	20,128	60	30	0.11	66,424	7	11.85		61.1
Cogswell	9	6,309	50	30	0.11	20,821		6.66		12.4
Peck	9	34,781	40	30	0.11	114,777	2	33.84	4	797.3
Ramona	9	34,927	30	30	0.11	115,261	1	60.06	2	1060.5
Cypress	9	4,169	30	30	0.11	13,757		12.54		11.5
Tyler	9	14,613	30	30	0.11	48,224		37.56	3	58.3
Arden	9	13,746	35	30	0.11	45,361		26.35	7	46.6
Baldwin	9	26,240	40	30	0.11	86,590	4	30.82	5	164.6
Temple City	9	22,534	45	30	0.11	74,362	5	22.49	9	98.0
Lower Azusa	9	12,394	50	30	0.11	40,899		11.93		30.0
Encinita	9	5,859	50	30	0.11	19,334		6.22		11.3
Walnut Grove	9	5,076	50	30	0.11	16,750		5.45		9.6
San Gabriel	9	34,437	50	30	0.11	113,643	3	21.67	10	600.1
Del Mar	9	14,956	50	30	0.11	49,354	10	13.82		40.3
Mission	9	16,354	50	30	0.11	53,968	9	14.77		46.9
Ramona	9	17,856	50	30	0.11	58,924	8	15.72		55.0
Valley	9	21,980	25	30	0.11	72,532	6	71.50	1	149.4
Boca	NA	6,535	25	30	0.00	0		27.34	6	22.6
Vineburn	NA	2,274	20	30	0.00	0		15.76		8.4
San Pablo	NA	3,380	20	30	0.00	0		23.07	8	12.9
TOTALS:						**1,010,980**		**469.39**		3296.9
SP LA TRANSPORTATION CENTER TO NORTHERN ORANGE CO - SEGMENT 5										
Washington Blvd	NA	27,210	10	22	0.00	0		498.06	2	628.7
Santa Fe Ave	NA	17,238	10	22	0.00	0		380.03	3	207.0
25th St	NA	5,070	10	22	0.00	0		134.92		38.4
E. Alameda st	NA	9,014	10	22	0.00	0		226.52	6	77.5
41st Street	4	11,177	10	26	0.34	98,803	4	271.81	5	103.9
Vernon Ave	4	13,633	10	6	0.34	27,811		318.99	4	139.5
51st Street	4	225	10	4	0.34	306		6.41		1.5
55th Street	8	6,974	10	30	0.20	41,845		180.61	8	56.0
Slauson Ave	8	31,885	10	30	0.20	191,312	1	527.71	1	1300.1
Randolph St	8	7,594	20	30	0.20	45,563	10	48.83		33.0
Gage Ave	9	19,266	20	30	0.11	63,579	7	102.74		136.1
Florence Ave	9	29,643	20	22	0.11	71,737	6	129.17		469.3
Nadeau st	9	14,084	20	22	0.11	34,082		81.97		77.9
Santa Fe Ave	9	10,028	15	12	0.11	13,236		110.43		61.4
Long Beach Blvd	9	20,618	15	32	0.11	72,577	5	190.61	7	203.2
State St	9	13,520	20	12	0.11	17,847		79.40		73.1
California Ave	9	12,394	20	12	0.11	16,360		74.10		64.0
San Juan Ave	9	3,380	20	8	0.11	2,974		23.07		12.9
Otis Ave	9	13,520	20	12	0.11	17,847		79.40		73.1
Atlantic Ave	9	28,167	20	12	0.11	37,181		126.64		379.0
Garfield Ave	9	27,153	20	8	0.11	23,895		124.67		331.2
Firestone Blvd	9	48,560	20	8	0.11	42,733		125.25		-608.4
Rives Ave	9	9,014	20	8	0.11	7,932		56.75		41.1

2000 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Paramount Bvlvd	9	27,829	20	4	0.11	12,245		126.01		362.0
Downey Ave	9	10,692	20	8	0.11	9,409		65.64		51.8
Dolan Ave	9	406	20	14	0.11	625		2.88		1.4
Brookshire Ave	9	9,577	20	14	0.11	14,748		59.79		44.6
Patton Rd	9	9,014	20	14	0.11	13,881		56.75		41.1
Lakewood Blvd	9	38,308	20	32	0.11	134,842	2	135.72	9	-16480.3
Woodruff Ave	9	15,774	20	32	0.11	55,523	8	89.30		93.9
Stewart & Gray Rd	9	9,464	20	12	0.11	12,493		59.19		43.9
Regent View Ave	9	2,704	20	12	0.11	3,569		18.63		10.1
Hoxie Ave	8A	113	20	8	0.11	99		0.80		0.4
Studebaker Rd	8	13,768	20	8	0.20	22,029		80.54		75.2
Orr & Day Rd	8	28	20	8	0.20	45		0.20		0.1
Pioneer Blvd	9	16,844	20	8	0.11	14,823		93.66		105.3
San Antonio Blvd	9	19,830	20	8	0.11	17,450		104.70		144.4
Funston Ave	8	3,718	20	8	0.20	5,949		25.26		14.3
Rosecrans Ave	9	31,547	20	8	0.11	27,762		131.82		646.8
Bloomfield Ave	9	7,887	20	8	0.11	6,940		50.49		34.6
Shoemaker Ave	9	513	20	6	0.11	338		3.64		1.8
Carmenita Rd	8	3,380	20	8	0.20	5,408		23.07		12.9
Alondra Blvd	9	4,507	20	12	0.11	5,949		30.29		17.8
Marquardt Ave	9A	338	20	6	0.11	223		2.40		1.2
Valley View Ave	9	2,253	20	14	0.11	3,470		15.62		8.3
Artesia Blvd	9	28,167	20	14	0.11	43,378		126.64		379.0
Knott Ave	9	22,534	20	14	0.11	34,702		113.25		192.8
Western Ave	9A	16,900	20	14	0.11	26,027		93.88		106.0
Beach Blvd	9	38,308	20	32	0.11	134,842	3	135.72	10	-16480.3
Stanton Ave	9	13,070	20	32	0.11	46,005	9	77.31		69.4
TOTALS:						**1,480,397**		**5621.28**		#####
COLTON YARD TO LA VERNE TRANSFER STATION - SEGMENT 6										
Meridian Ave	NA	676	50	4	0.00	0		0.77		1.1
Pepper Ave	8	11,267	50	4	0.20	9,014	6	11.04	10	26.2
Eucalyptus Ave	3	2,253	50	4	0.34	3,065		2.52		3.9
Acacia Ave	9	3,380	60	4	0.11	1,487		2.59		5.3
Sycamore Ave	3	3,943	60	4	0.34	5,363		2.99		6.3
Date Ave	3	225	60	4	0.34	306		0.18		0.3
Olive Ave	3	225	60	4	0.34	306		0.18		0.3
Riverside Ave	9	13,520	60	4	0.11	5,949	10	8.90		30.0
Orange Ave	3	225	60	4	0.34	306		0.18		0.3
Palm Ave	3	563	60	4	0.34	766		0.45		0.8
Willow Ave	9	2,253	60	4	0.11	991		1.75		3.4
Lilac Ave	9	1,915	60	4	0.11	843		1.49		2.9
Cactus Ave	9	2,817	60	4	0.11	1,239		2.17		4.3
Cedar Ave	9	2,817	60	4	0.11	1,239		2.17		4.3
Linden Ave	3	789	60	4	0.34	1,073		0.62		1.2
Maple Ave	3	563	60	4	0.34	766		0.45		0.8
Locust Ave	3	2,704	60	4	0.34	3,678		2.09		4.2
Laurel Ave	3	759	60	4	0.34	1,033		0.60		1.1
Alder Ave	9A	4,619	60	4	0.11	2,033		3.47		7.5
Tamarind Ave	3	1,915	60	4	0.34	2,605		1.49		2.9
Palmetto Ave	3	3,267	60	4	0.34	4,444		2.50		5.1
Mango Ave	8	6,760	60	4	0.20	5,408		4.93		11.7
Sierra Ave	8	13,858	60	4	0.20	11,087	5	9.07		31.2
Juniper Ave	9	5,859	50	4	0.11	2,578		6.22		11.3
Cypress Ave	3	2,817	50	4	0.34	3,831		3.12		5.0
Oleander Ave	3	2,817	50	4	0.34	3,831		3.12		5.0
Citrus Ave	9A	3,380	50	4	0.11	1,487		3.72		6.1

2000 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Tokay Ave	NA	394	50	4	0.00	0		0.45		0.7
Almeria Ave	NA	169	50	4	0.00	0		0.19		0.3
Sultana Ave	NA	23	50	4	0.00	0		0.03		0.0
Hemlock Ave	NA	113	50	4	0.00	0		0.13		0.2
Miller Ave	NA	282	50	4	0.00	0		0.32		0.5
Redwood Ave	NA	282	50	4	0.00	0		0.32		0.5
Base Line St	NA	1,127	50	4	0.00	0		1.28		1.9
East Ave	3	676	50	4	0.34	919		0.77		1.1
Etiwanda Ave	9	2,817	50	4	0.11	1,239		3.12		5.0
Milliken Ave	9	5,633	50	4	0.11	2,479		6.00		10.8
Haven Ave	9	8,338	50	4	0.11	3,669		8.54		17.5
Hermosa Ave	3	676	50	4	0.34	919		0.77		1.1
Ramona Ave	3	225	50	4	0.34	306		0.26		0.4
Archibald Ave	9	3,831	50	4	0.11	1,686		4.18		7.0
Amethyst Ave	3	2,704	50	4	0.34	3,678		3.00		4.8
Base Line St	9	9,014	50	4	0.11	3,966		9.14		19.3
Hellman Ave	3	2,817	50	4	0.34	3,831		3.12		5.0
Grove Ave	9A	9,915	50	4	0.11	4,363		9.92		21.9
11th St	NA	676	50	4	0.00	0		0.77		1.1
10th St	NA	676	50	4	0.00	0		0.77		1.1
9th St	NA	676	50	4	0.00	0		0.77		1.1
8th St	NA	676	50	4	0.00	0		0.77		1.1
Campus Ave	3	5,408	50	4	0.34	7,355	7	5.78		10.3
6th St	3	676	50	4	0.34	919		0.77		1.1
3rd St	3	2,817	50	4	0.34	3,831		3.12		5.0
2nd St	3	2,141	50	4	0.34	2,911		2.39		3.7
1st St	3	1,127	50	4	0.34	1,532		1.28		1.9
Euclid Ave	9	27,717	50	4	0.11	12,195	2	20.26	8	167.3
Laurel Ave	NA	563	50	4	0.00	0		0.64		0.9
Palm Ave	NA	563	50	4	0.00	0		0.64		0.9
San Antonio Ave	3	8,338	50	4	0.34	11,339	3	8.54		17.5
Mountain Ave	9	15,098	40	4	0.11	6,643	9	21.70	7	48.6
Benson Ave	NA	3,943	40	4	0.00	0		6.71		8.5
Central Ave	9A	15,774	40	4	0.11	6,940	8	22.42	6	52.4
Claremont Blvd	9	0	30	4	0.11	0		0.00		0.0
Towne Ave	9	8,970	30	4	0.11	3,947		25.17	4	28.8
Garey Ave	9	13,182	30	4	0.11	5,800		34.67	2	49.6
Pine St	NA	8,970	30	30	0.00	0		25.17	5	28.8
Fulton Rd	9	13,182	30	10	0.11	14,501	1	34.67	1	49.6
White Ave	9	10,256	30	10	0.11	11,282	4	28.23	3	34.5
Arrow Hwy	9	2,253	30	6	0.11	1,487		6.96		5.9
E Street	3	1,127	30	6	0.34	2,298		3.53		2.9
D Street	NA	5,633	30	6	0.00	0		16.60	9	16.2
TOTALS:						**194,763**		**402.68**		819.2
LA VERNE TRANSFER STATION TO IRWINDALE TRANSFER STATION - SEGMENT 7										
San Dimas Cyn Rd	9	0	40	6	0.11	0		0.00		0.0
Walnut Ave	9A	169	40	6	0.11	112		0.30		0.3
San Dimas Ave	9	169	40	6	0.11	112		0.30		0.3
Cataract Ave	9A	169	40	6	0.11	112		0.30		0.3
Lone Hill Ave	9	451	40	6	0.11	297		0.80		0.9
Valley Center Ave	9	3,031	40	6	0.11	2,000	7	5.22	8	6.4
Sunflower Ave	9A	4,867	40	6	0.11	3,212	5	8.17	6	10.8
Covina Blvd	9A	3,943	40	6	0.11	2,603	6	6.71	7	8.5
Bonnie Cove Ave	9	163	40	6	0.11	108		0.29		0.3
Cypress St	8	845	40	6	0.20	1,014	10	1.50	10	1.7
Glendora Ave	8	107	40	6	0.20	128		0.19		0.2

2000 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Grand Ave	9	2,366	40	6	0.11	1,562	9	4.11	9	4.9
Barranca Ave	8	10,140	30	6	0.20	12,168	1	27.96	2	34.0
Citrus Ave	9	2,670	30	6	0.11	1,762	8	8.20	5	7.1
Hollenbeck Ave	8	8,450	30	6	0.20	10,140	2	23.90	3	26.7
Azusa Ave	9	14,534	30	6	0.11	9,593	3	37.40	1	57.8
Lark Ellen Ave	9	451	30	6	0.11	297		1.43		1.1
Vincent Ave	9A	451	30	6	0.11	297		1.43		1.1
Irwindale Ave	8	7,005	30	6	0.20	8,406	4	20.23	4	21.1
TOTALS:						**53,923**		**148.45**		183.5
IRWINDALE TRANSFER STATION TO BASSETT JUNCTION - SEGMENT 8										
Cypress St	NA	23	20	6	0.00	0	3	0.16	3	0.1
Ramon Bl/Dowling Ave.	9	23	20	6	0.11	15	1	0.16	1	0.1
Pacific Ave	NA	23	20	6	0.00	0	4	0.16	4	0.1
MacDevitt St	NA	23	20	6	0.00	0	5	0.16	5	0.1
Merced Ave	NA	23	20	6	0.00	0	6	0.16	6	0.1
Francisquito Ave	9	23	20	6	0.11	15	2	0.16	2	0.1
Dalewood St	NA	23	20	6	0.00	0	7	0.16	7	0.1
Amar Rd	NA	23	20	6	0.00	0	8	0.16	8	0.1
TOTALS:						**30**		**1.29**		0.6

2005 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
EAGLE MOUNTAIN TO FERRUM - Segment 1A										
NO CROSSINGS										
FERRUM TO COLTON YARD - Segment 1B										
Parkside Dr.	8	808	15	45	0.20	7,276		10.15	10	3.7
Bay Dr.	9	1,646	15	45	0.11	8,145		20.42	5	7.8
Cleveland St.	9	178	35	45	0.11	883		0.42		0.4
Hammond Rd.	9	958	35	45	0.11	4,744		2.21		2.1
66th Av.	9	9,364	35	45	0.11	46,353	5	19.21	6	26.9
62nd Av.	9	1,465	35	45	0.11	7,251		3.36		3.3
58th Av.	8	1,886	35	45	0.20	16,971		4.30		4.3
Airport Blvd.	9	13,733	35	45	0.11	67,976	3	26.33	3	46.5
Av. 54	GS	0	35	45	0.00	0		0.00		0.0
52nd Av.	9	2,963	35	45	0.11	14,666		6.66		6.9
5th St.	8	614	35	45	0.20	5,522		1.42		1.3
50th Av.	8	3,403	35	45	0.20	30,625	9	7.61		8.1
Dillon Rd.	9	17,352	35	45	0.11	85,891	1	31.34	1	69.0
South Indio Oh	GS	0	35	45	0.00	0		0.00		0.0
Jackson St. SR 10	GS	49,896	35	45	0.00	0		0.00		-344.5
Monroe St. Oh	GS	0	35	45	0.00	0		0.00		0.0
Monroe St.	GS	22,205	35	45	0.00	0		0.00		115.5
Indio Oh St. 10	GS	0	35	45	0.00	0		0.00		0.0
Washington St. DVHD	GS	8,468	35	45	0.00	0		0.00		23.6
Monterey Av.	GS	0	35	45	0.00	0		0.00		0.0
Ramon Rd. Oh	GS	15,887	35	45	0.00	0		0.00		59.0
Date Palm Dr. Oh	GS	10,560	35	45	0.00	0		0.00		31.6
Palm Dr. Oh	GS	13,373	35	45	0.00	0		0.00		44.6
Indian Av. Oh	GS	13,763	35	45	0.00	0		0.00		46.6
Tipton Rd.	9	269	35	45	0.11	1,330		0.63		0.6
Palm Spr OVH St. 111	GS	0	35	45	0.00	0		0.00		0.0
Broadway	9	4,459	35	45	0.11	22,070	10	9.82		10.9
Apache Trail	9	9,036	35	45	0.11	44,729	6	18.63	7	25.6
Hargreave St.	9	9,005	35	45	0.11	44,576	7	18.58	8	25.5
San Gorgonio Av.	9A	8,827	35	45	0.11	43,693	8	18.26	9	24.9
Eight St.	GS	0	35	45	0.00	0		0.00		0.0
22nd St.	9	16,959	35	45	0.11	83,949	2	30.83	2	66.2
North Sunset Av.	9A	1,586	35	45	0.11	7,851		3.63		3.6
Highland Springs Av.	9	687	35	45	0.11	3,402		1.59		1.5
Pennsylvania Av.	9	1,496	35	45	0.11	7,404		3.43		3.4
Beaumont Av. St. 79	9	10,173	35	45	0.11	50,355	4	20.62	4	30.0
California Av.	9	3,441	35	45	0.11	17,032		7.69		8.2
Veile Av.	8	1,196	35	45	0.20	10,765		2.76		2.7
Beaumont Oh St. 60	GS	13,388	35	45	0.00	0		0.00		44.7
San Timoteo Cyn Rd.	9	1,077	35	45	0.11	5,332		2.49		2.4
Live Oak Cyn Rd.	9	2,304	35	45	0.11	11,406		5.23		5.3
Allesandro Rd.	9	1,873	35	45	0.11	9,273		4.28		4.3
San Timateo Cyn Rd.	9	0	35	45	0.11	0		0.00		0.0
Beaumont Av.	9	731	35	45	0.11	3,617		1.69		1.6
Whittier Av.	9	428	35	45	0.11	2,117		1.00		0.9
Barton Rd. Oh	GS	0	35	45	0.00	0		0.00		0.0
Mountain View Av.	GS	0	35	45	0.00	0		0.00		0.0
Anderson St. Oh	GS	0	15	45	0.00	0		0.00		0.0
Waterman Av.	GS	0	15	45	0.00	0		0.00		0.0
Hunts Ln.	GS	0	15	45	0.00	0		0.00		0.0
Colton Loma Linda Yd	GS	0	15	45	0.00	0		0.00		0.0
Colton St. 15	GS	0	15	45	0.00	0		0.00		0.0
So. East Conn. Oh	GS	0	15	45	0.00	0		0.00		0.0

2005 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Mount Vernon Av.	GS	0	15	45	0.00	0		0.00		0.0
TOTALS:						**665,205**		**284.59**		418.9
COLTON YARD TO INDUSTRY TRANSFER YARD - Segment 2										
Colton Yard	GS	0	15	46	0.00	0		0.00		0.0
La Cadena Dr. Up	GS	0	15	46	0.00	0		0.00		0.0
Rancho Av. Oh	GS	0	15	46	0.00	0		0.00		0.0
Pepper Av. Oh	GS	3,934	15	46	0.00	0		0.00		19.8
Riverside Av. Oh	GS	28,063	40	46	0.00	0		0.00		208.4
Cedar Av. Oh	GS	40,654	40	46	0.00	0		0.00		-1130.3
Sierra Av. Oh	GS	45,898	40	46	0.00	0		0.00		-428.8
Citrus Av. Oh	GS	16,523	40	46	0.00	0		0.00		56.8
Cherry Av. Oh	GS	9,966	40	46	0.00	0		0.00		26.2
Etiwanda Av.	GS	25,441	40	46	0.00	0		0.00		149.5
Vina Vista Oh	GS	0	40	46	0.00	0		0.00		0.0
Milliken Av.	9	27,276	40	46	0.11	138,017	2	31.37	2	187.7
Haven Av.	GS	0	40	46	0.00	0		0.00		0.0
Turner Av.	9	2,097	40	46	0.11	10,612		3.66		4.3
Archibald Av.	9	8,919	40	46	0.11	45,128		14.12		22.6
Vineyard Av.	9	23,604	40	46	0.11	119,437	3	29.19	3	121.0
Grove Av. Up	GS	0	40	46	0.00	0		0.00		0.0
Bon View Av.	9	18,622	40	46	0.11	94,228	6	25.22	6	70.9
Campus Av.	9	13,900	40	46	0.11	70,336		20.37		42.6
Sultana Av.	9	9,179	40	46	0.11	46,444		14.48		23.5
Euclid Av. Up	GS	0	40	46	0.00	0		0.00		0.0
Euclid Av. State 83	9	57,701	40	46	0.11	291,969	1	24.92	7	-216.1
Vine Av.	9	12,066	40	46	0.11	61,052		18.21		34.3
San Antonio Av.	9	11,278	40	46	0.11	57,068		17.23		31.1
Mountain Av. Oh	GS	0	40	46	0.00	0		0.00		0.0
Central Av. Oh	GS	0	40	46	0.00	0		0.00		0.0
Monte Vista Av.	9	13,638	40	46	0.11	69,008		20.07		41.3
Co Rd. Ramona Av.	9	19,453	40	46	0.11	98,430	5	25.96	5	77.4
East End Av.	9	15,607	40	46	0.11	78,970	7	22.24	8	51.4
Reservoir Av.	9	14,460	40	46	0.11	73,168	9	21.00	10	45.3
San Antonio Av.	9	15,266	40	46	0.11	77,246	8	21.88	9	49.5
Towne Av.	GS	0	40	46	0.00	0		0.00		0.0
Palamores St.	9	12,778	40	46	0.11	64,657		19.07		37.4
Garey Av.	GS	0	40	46	0.00	0		0.00		0.0
Main St.	9	7,159	40	46	0.11	36,225		11.63		17.1
Park Av.	9	14,033	40	46	0.11	71,005	10	20.52		43.2
White Av.	GS	0	40	46	0.00	0		0.00		0.0
Hamilton Bl.	9	22,592	40	46	0.11	114,317	4	28.48	4	108.2
State St. 71	GS	0	40	46	0.00	0		0.00		0.0
Humane Way	GS	0	40	46	0.00	0		0.00		0.0
Omar Oh	GS	0	40	46	0.00	0		0.00		0.0
Temple Av.	9	112	40	46	0.11	567		0.20		0.2
Pomona Bl.	9	8,183	40	46	0.11	41,406		13.10		20.3
Brea Canyon Rd.	9	8,909	40	46	0.11	45,078		14.11		22.6
Lemon Rd.	9	4,680	40	46	0.11	23,679		7.88		10.4
Fairway Dr.	9	0	40	46	0.11	0		0.00		0.0
Nogales Av.	9	5,247	15	46	0.11	26,548		61.96	1	27.4
Fullerton Rd.	GS	0	15	46	0.00	0		0.00		0.0
Azusa Av. Oh	GS	6,736	15	46	0.00	0		0.00		36.9
TOTALS:						**1,754,598**		**486.86**		-187.8
INUSTRY TRANSFER STATION TO BASSETT JUNCTION - SEGMENT 3										
Brea Canyon	9	20,742	60	30	0.11	68,447	4	12.07	3	65.2

2005 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Lemon	9	16,419	60	30	0.11	54,183	5	10.31	4	41.3
Fairway	9	686	60	30	0.11	2,265	9	0.54	9	1.0
Nogales	9	64,411	60	30	0.11	212,556	1	7.86	7	-132.4
California	9	12,458	60	30	0.11	41,112	7	8.34	6	26.5
Sunset	9	36,420	60	30	0.11	120,186	2	15.19	1	1251.2
Orange	9	8,263	60	30	0.11	27,268	8	5.90	8	15.1
Puente	9	34,315	60	30	0.11	113,241	3	15.07	2	505.6
Vineland	9	13,678	60	30	0.11	45,139	6	8.98	5	30.5
TOTALS:						**684,396**		**84.26**		1804.0
BASSETT JUNCTION TO SOUTHERN PACIFIC LA TRANSPORTATION CENTER - SEGMENT 4										
Temple	9	40,599	60	30	0.11	133,977	7	15.14		-847.9
Cogswell	9	12,726	50	30	0.11	41,997		12.19		31.3
Peck	9	70,154	40	30	0.11	231,507	2	9.68		-161.0
Ramona	9	70,449	30	30	0.11	232,482	1	16.37		-202.5
Cypress	9	8,408	30	30	0.11	27,748		23.79	9	26.5
Tyler	9	29,475	30	30	0.11	97,267		57.41	2	322.5
Arden	9	27,725	35	30	0.11	91,493		41.21	5	221.7
Baldwin	9	52,925	40	30	0.11	174,654	4	28.82	7	-261.6
Temple City	9	45,451	45	30	0.11	149,988	5	25.92	8	-410.4
Lower Azusa	9	24,998	50	30	0.11	82,494		19.30		119.4
Encinita	9	11,817	50	30	0.11	38,997		11.48		28.0
Walnut Grove	9	10,238	50	30	0.11	33,785		10.19		22.9
San Gabriel	9	69,460	50	30	0.11	229,219	3	6.88		-137.1
Del Mar	9	30,166	50	30	0.11	99,547	10	20.93		239.1
Mission	9	32,986	50	30	0.11	108,854	9	21.48		408.4
Ramona	9	36,015	50	30	0.11	118,851	8	21.80	10	1126.7
Valley	9	44,333	25	30	0.11	146,298	6	84.55	1	-762.3
Boca	NA	13,181	25	30	0.00	0		49.86	3	57.8
Vineburn	NA	4,586	20	30	0.00	0		30.78	6	18.2
San Pablo	NA	6,818	20	30	0.00	0		44.33	4	28.9
TOTALS:						**2,039,157**		**552.13**		-131.6
SP LA TRANSPORTATION CENTER TO NORTHERN ORANGE CO - SEGMENT 5										
Washington Blvd	NA	54,882	10	22	0.00	0		434.82	4	-810.5
Santa Fe Ave	NA	34,770	10	22	0.00	0		537.83	1	2683.9
25th St	NA	10,226	10	22	0.00	0		252.35	8	91.8
E. Alameda st	NA	18,180	10	22	0.00	0		394.37	5	228.7
41st Street	4	22,544	10	26	0.34	199,286	4	452.12	3	363.6
Vernon Ave	4	27,498	10	6	0.34	56,096		500.36	2	652.8
51st Street	4	455	10	4	0.34	618		12.88		3.0
55th Street	8	14,067	10	30	0.20	84,402		326.85	6	146.5
Slauson Ave	8	64,313	10	30	0.20	385,879	1	281.98	7	-609.4
Randolph St	8	15,317	20	30	0.20	91,902	10	87.37		89.3
Gage Ave	9	38,861	20	30	0.11	128,240	7	135.66		-5974.1
Florence Ave	9	59,791	20	22	0.11	144,694	6	91.10		-363.0
Nadeau st	9	28,407	20	22	0.11	68,745		127.08		391.8
Santa Fe Ave	9	20,226	15	12	0.11	26,698		188.30	10	194.9
Long Beach Blvd	9	41,588	15	32	0.11	146,388	5	238.89	9	-1985.8
State St	9	27,271	20	12	0.11	35,997		124.91		336.3
California Ave	9	24,998	20	12	0.11	32,997		119.84		254.4
San Juan Ave	9	6,818	20	8	0.11	6,000		44.33		28.9
Otis Ave	9	27,271	20	12	0.11	35,997		124.91		336.3
Atlantic Ave	9	56,814	20	12	0.11	74,994		102.46		-399.5
Garfield Ave	9	54,768	20	6	0.11	36,147		109.30		-432.1
Firestone Blvd	9	97,947	20	8	0.11	86,193		-202.06		-216.2
Rives Ave	9	18,180	20	8	0.11	15,999		98.81		121.4

2005 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Paramount Bvlvd	9	56,132	20	4	0.11	24,698		104.83		-409.6
Downey Ave	9	21,566	20	8	0.11	18,979		110.35		173.6
Dolan Ave	9	818	20	14	0.11	1,260		5.78		2.9
Brookshire Ave	9	19,317	20	14	0.11	29,748		102.92		136.8
Patton Rd	9	18,180	20	14	0.11	27,998		98.81		121.4
Lakewood Blvd	9	77,267	20	32	0.11	271,979	2	-9.20		-260.3
Woodruff Ave	9	31,816	20	32	0.11	111,991	8	132.14		680.6
Stewart & Gray Rd	9	19,089	20	12	0.11	25,198		102.12		133.5
Regent View Ave	9	5,454	20	12	0.11	7,199		36.17		22.2
Hoxie Ave	8A	227	20	8	0.11	200		1.62		0.8
Studebaker Rd	8	27,771	20	8	0.20	44,433		125.89		359.2
Orr & Day Rd	8	57	20	6	0.20	68		0.41		0.2
Pioneer Blvd	9	33,975	20	8	0.11	29,898		134.21		1116.6
San Antonio Blvd	9	39,997	20	8	0.11	35,197		135.36		-2649.9
Funston Ave	8	7,499	20	8	0.20	11,999		48.29		32.5
Rosecrans Ave	9	63,631	20	8	0.11	55,996		73.98		-328.4
Bloomfield Ave	9	15,908	20	8	0.11	13,999		89.85		95.3
Shoemaker Ave	9	1,034	20	6	0.11	682		7.29		3.7
Carmenita Rd	8	6,818	20	8	0.20	10,908		44.33		28.9
Alondra Blvd	9	9,090	20	12	0.11	11,999		57.17		41.6
Marquardt Ave	9A	682	20	6	0.11	450		4.83		2.4
Valley View Ave	9	4,545	20	12	0.11	6,000		30.53		18.0
Artesia Blvd	9	56,814	20	14	0.11	87,493		102.46		-399.5
Knott Ave	9	45,451	20	14	0.11	69,994		130.51		-807.0
Western Ave	9A	34,088	20	14	0.11	52,496		134.29		1152.9
Beach Blvd	9	77,267	20	32	0.11	271,979	3	-9.20		-260.3
Stanton Ave	9	26,362	20	32	0.11	92,793	9	123.00		299.7
TOTALS:						**2,972,904**		**6503.16**		#####
COLTON YARD TO LA VERNE TRANSFER STATION - SEGMENT 6										
Meridian Ave	NA	1,364	50	5	0.00	0		1.54		2.3
Pepper Ave	8	22,725	50	5	0.20	22,725	6	18.33	9	92.4
Eucalyptus Ave	3	4,545	50	5	0.34	7,727		4.92		8.4
Acacia Ave	9	6,818	60	5	0.11	3,750		4.97		11.9
Sycamore Ave	3	7,954	60	5	0.34	13,522		5.70		14.4
Date Ave	3	455	60	5	0.34	773		0.36		0.7
Olive Ave	3	455	60	5	0.34	773		0.36		0.7
Riverside Ave	9	27,271	60	5	0.11	14,999		14.00		138.0
Orange Ave	3	455	60	5	0.34	773		0.36		0.7
Palm Ave	3	1,136	60	5	0.34	1,932		0.90		1.7
Willow Ave	9	4,545	60	5	0.11	2,500		3.42		7.4
Lilac Ave	9	3,863	60	5	0.11	2,125		2.94		6.1
Cactus Ave	9	5,681	60	5	0.11	3,125		4.21		9.5
Cedar Ave	9	5,681	60	5	0.11	3,125		4.21		9.5
Linden Ave	3	1,591	60	5	0.34	2,704		1.25		2.4
Maple Ave	3	1,136	60	5	0.34	1,932		0.90		1.7
Locust Ave	3	5,454	60	5	0.34	9,272		4.05		9.1
Laurel Ave	3	1,532	60	5	0.34	2,604		1.20		2.3
Alder Ave	9A	9,317	60	5	0.11	5,125		6.55		17.6
Tamarind Ave	3	3,863	60	5	0.34	6,568		2.94		6.1
Palmetto Ave	3	6,590	60	5	0.34	11,204		4.82		11.4
Mango Ave	8	13,635	60	5	0.20	13,635		8.96		30.4
Sierra Ave	8	27,952	60	5	0.20	27,952	4	14.15		151.0
Juniper Ave	9	11,817	50	5	0.11	6,499		11.48		28.0
Cypress Ave	3	5,681	50	5	0.34	9,658		6.05		10.9
Oleander Ave	3	5,681	50	5	0.34	9,658		6.05		10.9
Citrus Ave	9A	6,818	50	5	0.11	3,750		7.14		13.6

2005 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Tokay Ave	NA	795	50	5	0.00	0		0.91		1.3
Almeria Ave	NA	341	50	5	0.00	0		0.39		0.6
Sultana Ave	NA	45	50	5	0.00	0		0.05		0.1
Hemlock Ave	NA	227	50	5	0.00	0		0.26		0.4
Miller Ave	NA	568	50	5	0.00	0		0.65		0.9
Redwood Ave	NA	568	50	5	0.00	0		0.65		0.9
Base Line St	NA	2,273	50	5	0.00	0		2.54		3.9
East Ave	3	1,364	50	5	0.34	2,318		1.54		2.3
Etiwanda Ave	9	5,681	50	5	0.11	3,125		6.05		10.9
Milliken Ave	9	11,363	50	5	0.11	6,250		11.12		26.5
Haven Ave	9	16,817	50	5	0.11	9,249		15.07		49.3
Hermosa Ave	3	1,364	50	5	0.34	2,318		1.54		2.3
Ramona Ave	3	455	50	5	0.34	773		0.52		0.8
Archibald Ave	9	7,727	50	5	0.11	4,250		7.99		15.8
Amethyst Ave	3	5,454	50	5	0.34	9,272		5.82		10.4
Base Line St	9	18,180	50	5	0.11	9,999		15.91		57.0
Hellman Ave	3	5,681	50	5	0.34	9,658		6.05		10.9
Grove Ave	9A	19,998	50	5	0.11	10,999		16.95		69.0
11th St	NA	1,364	50	5	0.00	0		1.54		2.3
10th St	NA	1,364	50	5	0.00	0		1.54		2.3
9th St	NA	1,364	50	5	0.00	0		1.54		2.3
8th St	NA	1,364	50	5	0.00	0		1.54		2.3
Campus Ave	3	10,908	50	5	0.34	18,544	8	10.75		25.0
6th St	3	1,364	50	5	0.34	2,318		1.54		2.3
3rd St	3	5,681	50	5	0.34	9,658		6.05		10.9
2nd St	3	4,318	50	5	0.34	7,340		4.69		8.0
1st St	3	2,273	50	5	0.34	3,863		2.54		3.9
Euclid Ave	9	55,905	50	5	0.11	30,748	2	17.01	10	-193.9
Laurel Ave	NA	1,136	50	5	0.00	0		1.29		1.9
Palm Ave	NA	1,136	50	5	0.00	0		1.29		1.9
San Antonio Ave	3	16,817	50	5	0.34	28,589	3	15.07		49.3
Mountain Ave	9	30,452	40	5	0.11	16,749	10	32.74	7	297.7
Benson Ave	NA	7,954	40	5	0.00	0		12.77		19.5
Central Ave	9A	31,816	40	5	0.11	17,499	9	33.18	6	379.6
Claremont Blvd	9	0	30	5	0.11	0		0.00		0.0
Towne Ave	9	18,092	30	5	0.11	9,950		43.86	4	84.8
Garey Ave	9	26,589	30	7	0.11	20,473	7	55.00	2	217.4
Pine St	NA	18,092	30	31	0.00	0		43.86	5	84.8
Fulton Rd	9	26,589	30	11	0.11	32,172	1	55.00	1	217.4
White Ave	9	20,687	30	11	0.11	25,031	5	47.91	3	111.5
Arrow Hwy	9	4,545	30	7	0.11	3,500		13.60		12.7
E Street	3	2,273	30	7	0.34	5,409		7.01		5.9
D Street	NA	11,363	30	7	0.00	0		30.75	8	39.8
TOTALS:						**488,462**		**677.78**		2252.0
LA VERNE TRANSFER STATION TO IRWINDALE TRANSFER STATION - SEGMENT 7										
San Dimas Cyn Rd	9	0	40	6	0.11	0		0.00		0.0
Walnut Ave	9A	341	40	6	0.11	225		0.61		0.7
San Dimas Ave	9	341	40	6	0.11	225		0.61		0.7
Cataract Ave	9A	341	40	6	0.11	225		0.61		0.7
Lone Hill Ave	9	909	40	6	0.11	600		1.61		1.8
Valley Center Ave	9	6,113	40	6	0.11	4,035	7	10.08	8	14.1
Sunflower Ave	9A	9,817	40	6	0.11	6,479	5	15.33	6	25.7
Covina Blvd	9A	7,954	40	6	0.11	5,250	6	12.77	7	19.5
Bonnie Cove Ave	9	330	40	6	0.11	217		0.59		0.6
Cypress St	8	1,704	40	6	0.20	2,045	10	2.99	10	3.5
Glendora Ave	8	216	40	6	0.20	259		0.39		0.4

2005 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Grand Ave	9	4,772	40	6	0.11	3,150	9	8.02	9	10.6
Barranca Ave	8	20,453	30	6	0.20	24,544	1	47.56	2	108.7
Citrus Ave	9	5,386	30	6	0.11	3,555	8	15.92	5	15.4
Hollenbeck Ave	8	17,044	30	6	0.20	20,453	2	42.07	3	75.9
Azusa Ave	9	29,316	30	6	0.11	19,348	3	57.30	1	314.9
Lark Ellen Ave	9	909	30	6	0.11	600		2.86		2.3
Vincent Ave	9A	909	30	6	0.11	600		2.86		2.3
Irwindale Ave	8	14,128	30	6	0.20	16,954	4	36.60	4	55.2
TOTALS:						**108,764**		**258.78**		653.1
IRWINDALE TRANSFER STATION TO BASSETT JUNCTION - SEGMENT 8										
Cypress St	NA	45	20	6	0.00	0	3	0.32	3	0.2
Ramon Bl/Dowling Ave.	9	45	20	6	0.11	30	1	0.32	1	0.2
Pacific Ave	NA	45	20	6	0.00	0	4	0.32	4	0.2
MacDevitt St	NA	45	20	6	0.00	0	5	0.32	5	0.2
Merced Ave	NA	45	20	6	0.00	0	6	0.32	6	0.2
Francisquito Ave	9	45	20	6	0.11	30	2	0.32	2	0.2
Dalewood St	NA	45	20	6	0.00	0	7	0.32	7	0.2
Amar Rd	NA	45	20	6	0.00	0	8	0.32	8	0.2
TOTALS:						**60**		**2.60**		1.3

2010 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
EAGLE MOUNTAIN TO FERRUM - Segment 1A										
NO CROSSINGS										
FERRUM TO COLTON YARD - Segment 1B										
Parkside Dr.	8	879	15	46	0.20	8,087		11.02	10	4.1
Bay Dr.	9	1,789	15	46	0.11	9,052		22.16	4	8.5
Cleveland St.	9	194	35	46	0.11	981		0.45		0.4
Hammond Rd.	9	1,042	35	46	0.11	5,272		2.40		2.3
66th Av.	9	10,181	35	46	0.11	51,514	5	20.63	6	30.1
62nd Av.	9	1,593	35	46	0.11	8,058		3.65		3.6
58th Av.	8	2,050	35	46	0.20	18,861		4.67		4.7
Airport Blvd.	9	14,930	35	46	0.11	75,545	3	28.08	3	53.2
Av. 54	GS	0	35	46	0.00	0		0.00		0.0
52nd Av.	9	3,221	35	46	0.11	16,299		7.22		7.6
5th St.	8	667	35	46	0.20	6,136		1.55		1.5
50th Av.	8	3,699	35	46	0.20	34,035	9	8.24		8.9
Dillon Rd.	9	18,865	35	46	0.11	95,455	1	33.19	1	81.0
South Indio Oh	GS	0	35	46	0.00	0		0.00		0.0
Jackson St. SR 10	GS	54,246	35	46	0.00	0		0.00		-274.3
Monroe St. Oh	GS	0	35	46	0.00	0		0.00		0.0
Monroe St.	GS	24,141	35	46	0.00	0		0.00		143.1
Indio Oh St. 10	GS	0	35	46	0.00	0		0.00		0.0
Washington St. DVHD	GS	9,206	35	46	0.00	0		0.00		26.3
Monterey Av.	GS	0	35	46	0.00	0		0.00		0.0
Ramon Rd. Oh	GS	17,272	35	46	0.00	0		0.00		68.5
Date Palm Dr. Oh	GS	11,481	35	46	0.00	0		0.00		35.6
Palm Dr. Oh	GS	14,539	35	46	0.00	0		0.00		50.9
Indian Av. Oh	GS	14,963	35	46	0.00	0		0.00		53.4
Tipton Rd.	9	292	35	46	0.11	1,478		0.68		0.6
Palm Spr OVH St. 111	GS	0	35	46	0.00	0		0.00		0.0
Broadway	9	4,847	35	46	0.11	24,528	10	10.62		12.0
Apache Trail	9	9,824	35	46	0.11	49,709	6	20.02	7	28.6
Hargreave St.	9	9,790	35	46	0.11	49,539	7	19.96	8	28.5
San Gorgonio Av.	9A	9,596	35	46	0.11	48,558	8	19.62	9	27.8
Eight St.	GS	0	35	46	0.00	0		0.00		0.0
22nd St.	9	18,438	35	46	0.11	93,296	2	32.68	2	77.4
North Sunset Av.	9A	1,724	35	46	0.11	8,725		3.94		3.9
Highland Springs Av.	9	747	35	46	0.11	3,781		1.73		1.6
Pennsylvania Av.	9	1,626	35	46	0.11	8,228		3.72		3.7
Beaumont Av. St. 79	9	11,060	35	46	0.11	55,962	4	22.12	5	33.7
California Av.	9	3,741	35	46	0.11	18,929		8.32		9.0
Veile Av.	8	1,300	35	46	0.20	11,964		2.99		2.9
Beaumont Oh St. 60	GS	14,555	35	46	0.00	0		0.00		51.0
San Timoteo Cyn Rd.	9	1,171	35	46	0.11	5,926		2.70		2.6
Live Oak Cyn Rd.	9	2,505	35	46	0.11	12,676		5.67		5.8
Allesandro Rd.	9	2,141	35	46	0.11	10,831		4.87		4.9
San Timateo Cyn Rd.	9	0	35	46	0.11	0		0.00		0.0
Beaumont Av.	9	835	35	46	0.11	4,225		1.93		1.8
Whittier Av.	9	489	35	46	0.11	2,472		1.14		1.1
Barton Rd. Oh	GS	0	35	46	0.00	0		0.00		0.0
Mountain View Av.	GS	0	35	46	0.00	0		0.00		0.0
Anderson St. Oh	GS	0	15	46	0.00	0		0.00		0.0
Waterman Av.	GS	0	15	46	0.00	0		0.00		0.0
Hunts Ln.	GS	0	15	46	0.00	0		0.00		0.0
Colton Loma Linda Yd	GS	0	15	46	0.00	0		0.00		0.0
Colton St. 15	GS	0	15	46	0.00	0		0.00		0.0
So. East Conn. Oh	GS	0	15	46	0.00	0		0.00		0.0

2010 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Mount Vernon Av.	GS	0	15	46	0.00	0		0.00		0.0
TOTALS:						**740,124**		**305.98**		606.1
COLTON YARD TO INDUSTRY TRANSFER YARD - Segment 2										
Colton Yard	GS	0	15	45	0.00	0		0.00		0.0
La Cadena Dr. Up	GS	0	15	45	0.00	0		0.00		0.0
Rancho Av. Oh	GS	0	15	45	0.00	0		0.00		0.0
Pepper Av. Oh	GS	4,496	15	45	0.00	0		0.00		23.0
Riverside Av. Oh	GS	32,067	40	45	0.00	0		0.00		398.8
Cedar Av. Oh	GS	46,454	40	45	0.00	0		0.00		-405.4
Sierra Av. Oh	GS	52,447	40	45	0.00	0		0.00		-267.9
Citrus Av. Oh	GS	18,880	40	45	0.00	0		0.00		72.9
Cherry Av. Oh	GS	11,388	40	45	0.00	0		0.00		31.6
Etiwanda Av.	GS	29,071	40	45	0.00	0		0.00		240.2
Vina Vista Oh	GS	0	40	45	0.00	0		0.00		0.0
Milliken Av.	9	31,168	40	45	0.11	154,281	2	32.98	2	336.6
Haven Av.	GS	0	40	45	0.00	0		0.00		0.0
Turner Av.	9	2,397	40	45	0.11	11,863		4.16		5.0
Archibald Av.	9	10,191	40	45	0.11	50,446		15.83		27.0
Vineyard Av.	9	26,972	40	45	0.11	133,511	4	31.21	4	180.5
Grove Av. Up	GS	0	40	45	0.00	0		0.00		0.0
Bon View Av.	9	21,279	40	45	0.11	105,332	6	27.48	6	93.9
Campus Av.	9	15,884	40	45	0.11	78,625		22.54		53.0
Sultana Av.	9	10,488	40	45	0.11	51,917		16.22		28.1
Euclid Av. Up	GS	0	40	45	0.00	0		0.00		0.0
Euclid Av. State 83	9	65,934	40	45	0.11	326,374	1	15.66		-174.2
Vine Av.	9	13,787	40	45	0.11	68,246		20.24		42.0
San Antonio Av.	9	12,887	40	45	0.11	63,793		19.20		37.9
Mountain Av. Oh	GS	0	40	45	0.00	0		0.00		0.0
Central Av. Oh	GS	0	40	45	0.00	0		0.00		0.0
Monte Vista Av.	9	15,584	40	45	0.11	77,140		22.22		51.3
Co Rd. Ramona Av.	9	22,228	40	45	0.11	110,029	5	28.21	5	104.0
East End Av.	9	19,071	40	45	0.11	94,403	7	25.62	7	74.3
Reservoir Av.	9	17,670	40	45	0.11	87,467	9	24.33	9	64.1
San Antonio Av.	9	18,655	40	45	0.11	92,343	8	25.25	8	71.2
Towne Av.	GS	0	40	45	0.00	0		0.00		0.0
Palamores St.	9	15,615	40	45	0.11	77,294		22.25		51.5
Garey Av.	GS	0	40	45	0.00	0		0.00		0.0
Main St.	9	8,748	40	45	0.11	43,305		13.89		22.1
Park Av.	9	17,148	40	45	0.11	84,882	10	23.82	10	60.7
White Av.	GS	0	40	45	0.00	0		0.00		0.0
Hamilton Bl.	9	27,608	40	45	0.11	136,659	3	31.53	3	196.0
State St. 71	GS	0	40	45	0.00	0		0.00		0.0
Humane Way	GS	0	40	45	0.00	0		0.00		0.0
Omar Oh	GS	0	40	45	0.00	0		0.00		0.0
Temple Av.	9	137	40	45	0.11	678		0.25		0.3
Pomona Bl.	9	10,000	40	45	0.11	49,499		15.58		26.4
Brea Canyon Rd.	9	10,886	40	45	0.11	53,888		16.73		29.6
Lemon Rd.	9	5,719	40	45	0.11	28,307		9.49		13.1
Fairway Dr.	9	0	40	45	0.11	0		0.00		0.0
Nogales Av.	9	6,411	15	45	0.11	31,737		74.47	1	34.8
Fullerton Rd.	GS	0	15	45	0.00	0		0.00		0.0
Azusa Av. Oh	GS	8,231	15	45	0.00	0		0.00		47.4
TOTALS:						**2,012,020**		**539.14**		1569.7
INUSTRY TRANSFER STATION TO BASSETT JUNCTION - SEGMENT 3										
Brea Canyon	9	25,346	60	30	0.11	83,643	4	13.53	3	108.7

2010 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Lemon	9	20,064	60	30	0.11	66,212	5	11.82	4	60.7
Fairway	9	839	60	30	0.11	2,768	9	0.66	8	1.2
Nogales	9	78,710	60	30	0.11	259,744	1	-2.25	9	-105.0
California	9	15,224	60	30	0.11	50,239	7	9.75	6	36.3
Sunset	9	44,505	60	30	0.11	146,867	2	14.77	2	-371.4
Orange	9	10,097	60	30	0.11	33,321	8	7.01	7	19.6
Puente	9	41,934	60	30	0.11	138,381	3	15.05	1	-578.7
Vineland	9	16,715	60	30	0.11	55,160	6	10.44	5	42.6
TOTALS:						**836,335**		**80.78**		-785.8
BASSETT JUNCTION TO SOUTHERN PACIFIC LA TRANSPORTATION CENTER - SEGMENT 4										
Temple	9	49,612	60	30	0.11	163,720	7	13.79		-231.9
Cogswell	9	15,552	50	30	0.11	51,320		14.23		43.0
Peck	9	85,728	40	30	0.11	282,902	2	-19.68		-132.5
Ramona	9	86,089	30	30	0.11	284,094	1	-36.36		-167.0
Cypress	9	10,275	30	30	0.11	33,908		28.27	7	34.6
Tyler	9	36,019	30	30	0.11	118,861		60.29	2	1695.8
Arden	9	33,880	35	30	0.11	111,805		43.94	5	675.5
Baldwin	9	64,675	40	30	0.11	213,428	4	17.29		-178.9
Temple City	9	55,541	45	30	0.11	183,286	5	21.21		-213.0
Lower Azusa	9	30,548	50	30	0.11	100,807		21.02		254.5
Encinita	9	14,441	50	30	0.11	47,654		13.46		38.1
Walnut Grove	9	12,511	50	30	0.11	41,285		12.02		30.5
San Gabriel	9	84,881	50	30	0.11	280,107	3	-11.41		-112.4
Del Mar	9	36,863	50	30	0.11	121,647	10	21.84	8	2012.4
Mission	9	40,309	50	30	0.11	133,020	9	21.78	9	-1083.8
Ramona	9	44,011	50	30	0.11	145,236	8	21.31	10	-454.6
Valley	9	54,175	25	30	0.11	178,777	6	71.21	1	-364.7
Boca	NA	16,107	25	30	0.00	0		58.10	3	80.1
Vineburn	NA	5,604	20	30	0.00	0		37.08	6	22.9
San Pablo	NA	8,331	20	30	0.00	0		52.99	4	37.2
TOTALS:						**2,491,858**		**462.37**		1985.6
SP LA TRANSPORTATION CENTER TO NORTHERN ORANGE CO - SEGMENT 5										
Washington Blvd	NA	67,066	10	21	0.00	0		224.79	7	-575.3
Santa Fe Ave	NA	42,489	10	21	0.00	0		534.18	2	-2359.8
25th St	NA	12,497	10	21	0.00	0		297.73	6	122.2
E. Alameda st	NA	22,217	10	21	0.00	0		448.28	4	350.9
41st Street	4	27,548	10	25	0.34	234,162	4	500.76	3	657.2
Vernon Ave	4	33,602	10	5	0.34	57,124		534.49	1	1905.1
51st Street	4	555	10	3	0.34	567		15.72		3.7
55th Street	8	17,190	10	29	0.20	99,702		379.27	5	206.0
Slauson Ave	8	78,591	10	29	0.20	455,827	1	-76.39		-482.7
Randolph St	8	18,717	20	29	0.20	108,561	10	100.78		128.4
Gage Ave	9	47,488	20	29	0.11	151,486	7	127.27		-662.2
Florence Ave	9	73,065	20	21	0.11	168,779	6	20.16		-275.7
Nadeau st	9	34,713	20	21	0.11	80,188		134.71		1397.3
Santa Fe Ave	9	24,716	15	11	0.11	29,906		211.58	9	318.7
Long Beach Blvd	9	50,820	15	31	0.11	173,297	5	213.60	8	-679.1
State St	9	33,325	20	11	0.11	40,323		133.68		943.0
California Ave	9	30,548	20	11	0.11	36,963		130.51		542.3
San Juan Ave	9	8,331	20	7	0.11	6,415		52.99		37.2
Otis Ave	9	33,325	20	11	0.11	40,323		133.68		943.0
Atlantic Ave	9	69,427	20	11	0.11	84,006		42.90		-292.3
Garfield Ave	9	66,927	20	5	0.11	36,810		57.08		-306.1
Firestone Blvd	9	119,691	20	7	0.11	92,162		-491.55		-193.8
Rives Ave	9	22,217	20	7	0.11	17,107		112.31		186.2

2010 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Paramount Bvlvd	9	68,593	20	3	0.11	22,636		47.75		-296.6
Downey Ave	9	26,354	20	7	0.11	20,293		122.98		299.4
Dolan Ave	9	1,000	20	13	0.11	1,430		7.05		3.6
Brookshire Ave	9	23,605	20	13	0.11	33,755		116.25		216.9
Patton Rd	9	22,217	20	13	0.11	31,770		112.31		186.2
Lakewood Blvd	9	94,420	20	31	0.11	321,973	2	-163.48		-221.4
Woodruff Ave	9	38,879	20	31	0.11	132,577	8	135.66	10	-5852.5
Stewart & Gray Rd	9	23,327	20	11	0.11	28,226		115.49		210.3
Regent View Ave	9	6,665	20	11	0.11	8,065		43.44		28.1
Hoxie Ave	8A	278	20	7	0.11	214		1.98		1.0
Studebaker Rd	8	33,936	20	7	0.20	47,510		134.18		1104.7
Orr & Day Rd	8	69	20	5	0.20	69		0.50		0.2
Pioneer Blvd	9	41,517	20	7	0.11	31,968		134.57		-1561.7
San Antonio Blvd	9	48,876	20	7	0.11	37,635		124.61		-594.5
Funston Ave	8	9,164	20	7	0.20	12,830		57.57		42.0
Rosecrans Ave	9	77,758	20	7	0.11	59,873		-12.85		-258.7
Bloomfield Ave	9	19,439	20	7	0.11	14,968		103.35		138.6
Shoemaker Ave	9	1,264	20	5	0.11	695		8.88		4.6
Carmenita Rd	8	8,331	20	7	0.20	11,664		52.99		37.2
Alondra Blvd	9	11,108	20	11	0.11	13,441		67.76		54.6
Marquardt Ave	9A	833	20	5	0.11	458		5.89		3.0
Valley View Ave	9	5,554	20	11	0.11	6,720		36.78		22.6
Artesia Blvd	9	69,427	20	13	0.11	99,280		42.90		-292.3
Knott Ave	9	55,541	20	13	0.11	79,424		106.81		-418.9
Western Ave	9A	41,656	20	13	0.11	59,568		134.47		-1507.4
Beach Blvd	9	94,420	20	31	0.11	321,973	3	-163.48		-221.4
Stanton Ave	9	32,214	20	31	0.11	109,850	9	132.58		736.6
TOTALS:						**3,422,572**		**5345.45**		#####
COLTON YARD TO LA VERNE TRANSFER STATION - SEGMENT 6										
Meridian Ave	NA	1,666	50	4	0.00	0		1.87		2.8
Pepper Ave	8	27,771	50	4	0.20	22,217	6	20.27	9	168.5
Eucalyptus Ave	3	5,554	50	4	0.34	7,554		5.92		10.6
Acacia Ave	9	8,331	60	4	0.11	3,666		5.94		15.2
Sycamore Ave	3	9,720	60	4	0.34	13,219		6.79		18.7
Date Ave	3	555	60	4	0.34	755		0.44		0.8
Olive Ave	3	555	60	4	0.34	755		0.44		0.8
Riverside Ave	9	33,325	60	4	0.11	14,663		14.98		386.9
Orange Ave	3	555	60	4	0.34	755		0.44		0.8
Palm Ave	3	1,389	60	4	0.34	1,888		1.09		2.1
Willow Ave	9	5,554	60	4	0.11	2,444		4.12		9.3
Lilac Ave	9	4,721	60	4	0.11	2,077		3.55		7.7
Cactus Ave	9	6,943	60	4	0.11	3,055		5.05		12.1
Cedar Ave	9	6,943	60	4	0.11	3,055		5.05		12.1
Linden Ave	3	1,944	60	4	0.34	2,644		1.52		2.9
Maple Ave	3	1,389	60	4	0.34	1,888		1.09		2.1
Locust Ave	3	6,665	60	4	0.34	9,064		4.87		11.5
Laurel Ave	3	1,872	60	4	0.34	2,546		1.46		2.8
Alder Ave	9A	11,386	60	4	0.11	5,010		7.75		23.2
Tamarind Ave	3	4,721	60	4	0.34	6,421		3.55		7.7
Palmetto Ave	3	8,053	60	4	0.34	10,953		5.76		14.6
Mango Ave	8	16,662	60	4	0.20	13,330		10.42		42.4
Sierra Ave	8	34,158	60	4	0.20	27,326	5	15.06		482.6
Juniper Ave	9	14,441	50	4	0.11	6,354		13.46		38.1
Cypress Ave	3	6,943	50	4	0.34	9,442		7.26		13.9
Oleander Ave	3	6,943	50	4	0.34	9,442		7.26		13.9
Citrus Ave	9A	8,331	50	4	0.11	3,666		8.53		17.4

2010 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Tokay Ave	NA	972	50	4	0.00	0		1.10		1.6
Almeria Ave	NA	417	50	4	0.00	0		0.48		0.7
Sultana Ave	NA	56	50	4	0.00	0		0.06		0.1
Hemlock Ave	NA	278	50	4	0.00	0		0.32		0.5
Miller Ave	NA	694	50	4	0.00	0		0.79		1.2
Redwood Ave	NA	694	50	4	0.00	0		0.79		1.2
Base Line St	NA	2,777	50	4	0.00	0		3.08		4.9
East Ave	3	1,666	50	4	0.34	2,266		1.87		2.8
Etiwanda Ave	9	6,943	50	4	0.11	3,055		7.26		13.9
Milliken Ave	9	13,885	50	4	0.11	6,110		13.06		35.7
Haven Ave	9	20,550	50	4	0.11	9,042		17.25		73.1
Hermosa Ave	3	1,666	50	4	0.34	2,266		1.87		2.8
Ramona Ave	3	555	50	4	0.34	755		0.63		0.9
Archibald Ave	9	9,442	50	4	0.11	4,154		9.51		20.5
Amethyst Ave	3	6,665	50	4	0.34	9,064		7.00		13.2
Base Line St	9	22,217	50	4	0.11	9,775		18.09		87.4
Hellman Ave	3	6,943	50	4	0.34	9,442		7.26		13.9
Grove Ave	9A	24,438	50	4	0.11	10,753		19.07	10	111.9
11th St	NA	1,666	50	4	0.00	0		1.87		2.8
10th St	NA	1,666	50	4	0.00	0		1.87		2.8
9th St	NA	1,666	50	4	0.00	0		1.87		2.8
8th St	NA	1,666	50	4	0.00	0		1.87		2.8
Campus Ave	3	13,330	50	4	0.34	18,129	8	12.65		33.5
6th St	3	1,666	50	4	0.34	2,266		1.87		2.8
3rd St	3	6,943	50	4	0.34	9,442		7.26		13.9
2nd St	3	5,276	50	4	0.34	7,176		5.65		10.0
1st St	3	2,777	50	4	0.34	3,777		3.08		4.9
Euclid Ave	9	68,316	50	4	0.11	30,059	2	7.95		-139.9
Laurel Ave	NA	1,389	50	4	0.00	0		1.57		2.4
Palm Ave	NA	1,389	50	4	0.00	0		1.57		2.4
San Antonio Ave	3	20,550	50	4	0.34	27,948	3	17.25		73.1
Mountain Ave	9	37,213	40	4	0.11	16,374	10	34.07	7	3487.4
Benson Ave	NA	9,720	40	4	0.00	0		15.20		25.4
Central Ave	9A	38,879	40	4	0.11	17,107	9	34.06	8	-3264.1
Claremont Blvd	9	0	30	4	0.11	0		0.00		0.0
Towne Ave	9	22,108	30	4	0.11	9,728		49.88	4	129.8
Garey Ave	9	32,492	30	6	0.11	21,444	7	59.19	2	550.3
Pine St	NA	22,108	30	30	0.00	0		49.88	5	129.8
Fulton Rd	9	32,492	30	10	0.11	35,741	1	59.19	1	550.3
White Ave	9	25,280	30	10	0.11	27,808	4	53.68	3	185.4
Arrow Hwy	9	5,554	30	6	0.11	3,666		16.38		16.0
E Street	3	2,777	30	6	0.34	5,665		8.51		7.4
D Street	NA	13,885	30	6	0.00	0		36.11	6	53.7
TOTALS:						**487,199**		**755.93**		3593.7
LA VERNE TRANSFER STATION TO IRWINDALE TRANSFER STATION - SEGMENT 7										
San Dimas Cyn Rd	9	0	40	6	0.11	0		0.00		0.0
Walnut Ave	9A	417	40	6	0.11	275		0.74		0.8
San Dimas Ave	9	417	40	6	0.11	275		0.74		0.8
Cataract Ave	9A	417	40	6	0.11	275		0.74		0.8
Lone Hill Ave	9	1,111	40	6	0.11	733		1.96		2.2
Valley Center Ave	9	7,470	40	6	0.11	4,930	7	12.08	8	18.1
Sunflower Ave	9A	11,997	40	6	0.11	7,918	5	18.12	6	34.0
Covina Blvd	9A	9,720	40	6	0.11	6,415	6	15.20	7	25.4
Bonnie Cove Ave	9	403	40	6	0.11	266		0.72		0.8
Cypress St	8	2,083	40	6	0.20	2,499	10	3.63	10	4.3
Glendora Ave	8	264	40	6	0.20	317		0.47		0.5

2010 PROJECT

LAST UPDATE 1/15/96

STREET NAME	CROSSING/ SIGNAL TYPE	ADT	SPEED (mph)	AVG. NO. OF TRAINS	PROTECTION FACTOR	HAZARD INDEX	HAZARD INDEX RANK	DELAY (min)	DELAY RANK	# OF VEH DEL
Grand Ave	9	5,832	40	6	0.11	3,849	9	9.66	9	13.4
Barranca Ave	8	24,994	30	6	0.20	29,992	1	53.37	2	179.3
Citrus Ave	9	6,582	30	6	0.11	4,344	8	19.13	5	19.5
Hollenbeck Ave	8	20,828	30	6	0.20	24,994	2	48.11	3	113.2
Azusa Ave	9	35,824	30	6	0.11	23,644	3	60.26	1	1536.0
Lark Ellen Ave	9	1,111	30	6	0.11	733		3.48		2.8
Vincent Ave	9A	1,111	30	6	0.11	733		3.48		2.8
Irwindale Ave	8	17,265	30	6	0.20	20,718	4	42.46	4	77.7
TOTALS:						**132,910**		**294.37**		2032.3
IRWINDALE TRANSFER STATION TO BASSETT JUNCTION - SEGMENT 8										
Cypress St	NA	56	20	6	0.00	0	3	0.40	3	0.2
Ramon Bl/Dowling Ave.	9	56	20	6	0.11	37	1	0.40	1	0.2
Pacific Ave	NA	56	20	6	0.00	0	4	0.40	4	0.2
MacDevitt St	NA	56	20	6	0.00	0	5	0.40	5	0.2
Merced Ave	NA	56	20	6	0.00	0	6	0.40	6	0.2
Francisquito Ave	9	56	20	6	0.11	37	2	0.40	2	0.2
Dalewood St	NA	56	20	6	0.00	0	7	0.40	7	0.2
Amar Rd	NA	56	20	6	0.00	0	8	0.40	8	0.2
TOTALS:						**73**		**3.17**		1.5

APPENDIX G
Future Conditions With the Project Traffic Operations Analysis Worksheets

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... EAGLE MTN RD N/O RAGSDALE RD
ANALYST..... RPH
TIME OF ANALYSIS..... 2000 BASE + PROJECT
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 20PREMRR.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	12.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	50 / 50
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	8
PERCENT NO PASSING ZONES.....	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	1	.89
B	2.2	2	2.5	1	1	.87
C	2.2	2	2.5	1	1	.87
D	2	1.6	1.6	1	1	.89
E	2	1.6	1.6	1	1	.89

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1032
ACTUAL FLOW RATE: 1032

LOS	SERVICE FLOW RATE	V/C
A	374	.15
B	659	.27
C	1050	.43
D	1597	.64
E	2496	1

LOS FOR GIVEN CONDITIONS: C

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... KAISER RD N/O DESERT CTR RICE RD
ANALYST..... RPH
TIME OF ANALYSIS..... 2000 BASE + PROJECT
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 20PRKRDC.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	31.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	4
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	43 / 57
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	4
PERCENT NO PASSING ZONES.....	20

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	.92	.96	.74
B	2.2	2	2.5	.92	.96	.7
C	2.2	2	2.5	.92	.96	.7
D	2	1.6	1.6	.92	.96	.75
E	2	1.6	1.6	.97	.96	.75

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 368
ACTUAL FLOW RATE: 368

LOS	SERVICE FLOW RATE	V/C
A	218	.12
B	413	.24
C	671	.39
D	1145	.62
E	1948	1

LOS FOR GIVEN CONDITIONS: B

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... KAISER RD N/O LAKE TAMARISK DR
ANALYST..... RPH
TIME OF ANALYSIS..... 2000 BASE + PROJECT
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 20PRKRLT.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	31.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	4
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	40 / 60
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	4
PERCENT NO PASSING ZONES.....	20

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	.92	.94	.74
B	2.2	2	2.5	.92	.94	.7
C	2.2	2	2.5	.92	.94	.7
D	2	1.6	1.6	.92	.94	.75
E	2	1.6	1.6	.97	.94	.75

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 351
ACTUAL FLOW RATE: 351

LOS	SERVICE FLOW RATE	V/C
A	214	.12
B	405	.24
C	658	.39
D	1124	.62
E	1911	1

LOS FOR GIVEN CONDITIONS: B

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... EAGLE MTN RD N/O RAGSDALE RD
ANALYST..... RPH
TIME OF ANALYSIS..... 2005 BASE + PROJECT
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 25PREMRR.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	12.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	50 / 50
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	8
PERCENT NO PASSING ZONES.....	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	1	.89
B	2.2	2	2.5	1	1	.87
C	2.2	2	2.5	1	1	.87
D	2	1.6	1.6	1	1	.89
E	2	1.6	1.6	1	1	.89

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1040
ACTUAL FLOW RATE: 1040

LOS	SERVICE FLOW RATE	V/C
A	374	.15
B	659	.27
C	1050	.43
D	1597	.64
E	2496	1

LOS FOR GIVEN CONDITIONS: C

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... KAISER RD N/O DESERT CTR RICE RD
ANALYST..... RPH
TIME OF ANALYSIS..... 2005 BASE + PROJECT
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 25PRKRDC.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	31.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	4
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	43 / 57
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	4
PERCENT NO PASSING ZONES.....	20

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	.92	.96	.74
B	2.2	2	2.5	.92	.96	.7
C	2.2	2	2.5	.92	.96	.7
D	2	1.6	1.6	.92	.96	.75
E	2	1.6	1.6	.97	.96	.75

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 376
ACTUAL FLOW RATE: 376

LOS	SERVICE FLOW RATE	V/C
A	218	.12
B	413	.24
C	671	.39
D	1145	.62
E	1948	1

LOS FOR GIVEN CONDITIONS: B

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... KAISER RD N/O LAKE TAMARISK DR
ANALYST..... RPH
TIME OF ANALYSIS..... 2005 BASE + PROJECT
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 25PRKRLT.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	31.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	4
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	40 / 60
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	4
PERCENT NO PASSING ZONES.....	20

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	.92	.94	.74
B	2.2	2	2.5	.92	.94	.7
C	2.2	2	2.5	.92	.94	.7
D	2	1.6	1.6	.92	.94	.75
E	2	1.6	1.6	.97	.94	.75

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 356
ACTUAL FLOW RATE: 356

LOS	SERVICE FLOW RATE	V/C
A	214	.12
B	405	.24
C	658	.39
D	1124	.62
E	1911	1

LOS FOR GIVEN CONDITIONS: B

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... EAGLE MTN RD N/O RAGSDALE RD
ANALYST..... RPH
TIME OF ANALYSIS..... 2010 BASE + PROJECT
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 21PREMRR.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	12.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	50 / 50
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	8
PERCENT NO PASSING ZONES.....	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	1	.89
B	2.2	2	2.5	1	1	.87
C	2.2	2	2.5	1	1	.87
D	2	1.6	1.6	1	1	.89
E	2	1.6	1.6	1	1	.89

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1048
ACTUAL FLOW RATE: 1048

LOS	SERVICE FLOW RATE	V/C
A	374	.15
B	659	.27
C	1050	.43
D	1597	.64
E	2496	1

LOS FOR GIVEN CONDITIONS: C

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... KAISER RD N/O DESERT CTR RICE RD
ANALYST..... RPH
TIME OF ANALYSIS..... 2010 BASE + PROJECT
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 21PRKRDC.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	31.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	4
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	43 / 57
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	4
PERCENT NO PASSING ZONES.....	20

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	.92	.96	.74
B	2.2	2	2.5	.92	.96	.7
C	2.2	2	2.5	.92	.96	.7
D	2	1.6	1.6	.92	.96	.75
E	2	1.6	1.6	.97	.96	.75

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 387
ACTUAL FLOW RATE: 387

LOS	SERVICE FLOW RATE	V/C
A	218	.12
B	413	.24
C	671	.39
D	1145	.62
E	1948	1

LOS FOR GIVEN CONDITIONS: B

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... KAISER RD N/O LAKE TAMARISK DR
ANALYST..... RPH
TIME OF ANALYSIS..... 2010 BASE + PROJECT
DATE OF ANALYSIS..... 11-30-1995
OTHER INFORMATION.... FILENAME: 21PRKRLT.RUR

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	31.2
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	4
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	40 / 60
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	4
PERCENT NO PASSING ZONES.....	20

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	.92	.94	.74
B	2.2	2	2.5	.92	.94	.7
C	2.2	2	2.5	.92	.94	.7
D	2	1.6	1.6	.92	.94	.75
E	2	1.6	1.6	.97	.94	.75

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 362
ACTUAL FLOW RATE: 362

LOS	SERVICE FLOW RATE	V/C
A	214	.12
B	405	.24
C	658	.39
D	1124	.62
E	1911	1

LOS FOR GIVEN CONDITIONS: B

****

File Name L12BPAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2000 AM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	0	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	0	70	3		183	4	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		3
Potential Capacity: (pcph)		1380
Movement Capacity: (pcph)		1380
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-free State:	0.95	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		73
Potential Capacity: (pcph)		999
Capacity Adjustment Factor due to Impeding Movements		0.95
Movement Capacity: (pcph)		952
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		73
Potential Capacity: (pcph)		961
Major LT, Minor TH Impedance Factor:		0.95
Adjusted Impedance Factor:		0.95
Capacity Adjustment Factor due to Impeding Movements		0.95
Movement Capacity: (pcph)		916

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	212	916	917	5.1	B	
EB T	4	952				5.1
SB L	81	1714		2.2	A	2.1

Intersection Delay = 4.3

File Name L12BPPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2000 PM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	0	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	2	83	6		382	2	2			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		6
Potential Capacity: (pcph)		1375
Movement Capacity: (pcph)		1375
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	2	
Potential Capacity: (pcph)	1711	
Movement Capacity: (pcph)	1711	
Prob. of Queue-free State:	0.94	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		91
Potential Capacity: (pcph)		977
Capacity Adjustment Factor due to Impeding Movements		0.94
Movement Capacity: (pcph)		922
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		90
Potential Capacity: (pcph)		939
Major LT, Minor TH Impedance Factor:		0.94
Adjusted Impedance Factor:		0.94
Capacity Adjustment Factor due to Impeding Movements		0.94
Movement Capacity: (pcph)		886

****

Intersection Performance Summary

Movement		FlowRate v(pcph)	MoveCap Cm(pcph)		SharedCap Csh(pcph)	Avg.Total Delay		LOS	Delay By App
EB	L	442	886	>	886	>	8.1	> B	
EB	T	2	922	>		>		>	8.1
EB	R	2	1375			2.6		A	
SB	L	96	1711			2.2		A	2.1

Intersection Delay = 6.9

****

File Name L22BPAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2000 AM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1	1
Stop/Yield			N			N						
Volumes	0	183			73	237				0	0	151
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	183	
Potential Capacity: (pcph)	1118	
Movement Capacity: (pcph)	1118	
Prob. of Queue-free State:	0.84	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		310
Potential Capacity: (pcph)		1220
Movement Capacity: (pcph)		1220
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	493	
Potential Capacity: (pcph)	601	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	601	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	256	
Potential Capacity: (pcph)	753	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	753	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB R	175	1118		3.8	A	

Intersection Delay = 0.9

****

File Name L22BPPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2000 PM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1	1
Stop/Yield			N			N						
Volumes	1	382			89	384				0	2	182
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	382	
Potential Capacity: (pcph)	887	
Movement Capacity: (pcph)	887	
Prob. of Queue-free State:	0.76	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		473
Potential Capacity: (pcph)		1020
Movement Capacity: (pcph)		1020
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	856	
Potential Capacity: (pcph)	388	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	388	
Prob. of Queue-free State:	0.99	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	472	
Potential Capacity: (pcph)	564	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	563	

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB T	2	388		9.3	B	5.4
WB R	211	887		5.3	B	
NB L	1	1020		3.5	A	0.0

Intersection Delay = 1.0

****

File Name L32BPAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) Ragsdale Road
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2000 AM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	0	0	0	1>	0<	1
Stop/Yield			N			N						
Volumes		333	1	1	304					6		2
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0			0			0	
MC's (%)		0	0	0	0					0		0
SU/RV's (%)		0	0	0	0					0		0
CV's (%)		0	0	0	0					0		0
PCE's		1.1	1.1	1.1	1.1					1.1		1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	333	
Potential Capacity: (pcph)	939	
Movement Capacity: (pcph)	939	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	334	
Potential Capacity: (pcph)	1188	
Movement Capacity: (pcph)	1188	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

tep 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	638	
Potential Capacity: (pcph)	452	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	452	

****

Intersection Performance Summary

Movement		FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB	L	7	452	511	7.2	B	7.2
WB	R	2	939				
SB	L	1	1188		3.0	A	0.0

Intersection Delay = 0.1

****

File Name L32BPPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) Ragsdale Road
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2000 PM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	0	0	0	1>	0<	1
Stop/Yield			N			N						
Volumes		560	2	2	472					1		1
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0			0			0	
MC's (%)		0	0	0	0					0		0
SU/RV's (%)		0	0	0	0					0		0
CV's (%)		0	0	0	0					0		0
PCE's		1.1	1.1	1.1	1.1					1.1		1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	560	
Potential Capacity: (pcph)	720	
Movement Capacity: (pcph)	720	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	562	
Potential Capacity: (pcph)	925	
Movement Capacity: (pcph)	925	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	1034	
Potential Capacity: (pcph)	267	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	266	

Intersection Performance Summary

Movement		FlowRate v(pcph)	MoveCap Cm(pcph)		SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB	L	1	266	>		>	>	
					388	9.3	B	9.3
WB	R	1	720	>		>	>	
SB	L	2	925			3.9	A	0.0

Intersection Delay = 0.0

****

File Name L42BPAM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2000 AM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	0	42	2		124	1	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		2
Potential Capacity: (pcph)		1381
Movement Capacity: (pcph)		1381
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-free State:	0.97	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		44
Potential Capacity: (pcph)		1034
Capacity Adjustment Factor due to Impeding Movements		0.97
Movement Capacity: (pcph)		1005
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		44
Potential Capacity: (pcph)		998
Major LT, Minor TH Impedance Factor:		0.97
Adjusted Impedance Factor:		0.97
Capacity Adjustment Factor due to Impeding Movements		0.97
Movement Capacity: (pcph)		970

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	144	970	970	4.4	A	
EB T	1	1005				4.4
SB L	48	1714		2.2	A	2.1

Intersection Delay = 3.8

****

File Name L42BPPM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2000 PM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		3	0	42	3		153	1	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		3
Potential Capacity: (pcph)		1380
Movement Capacity: (pcph)		1380
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	3	
Potential Capacity: (pcph)	1709	
Movement Capacity: (pcph)	1709	
Prob. of Queue-free State:	0.97	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		48
Potential Capacity: (pcph)		1029
Capacity Adjustment Factor due to Impeding Movements		0.97
Movement Capacity: (pcph)		1000
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		48
Potential Capacity: (pcph)		993
Major LT, Minor TH Impedance Factor:		0.97
Adjusted Impedance Factor:		0.97
Capacity Adjustment Factor due to Impeding Movements		0.97
Movement Capacity: (pcph)		965

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	177	965	965	4.6	A	
EB T	1	1000				4.6
SB L	48	1709		2.2	A	2.0

Intersection Delay = 3.9

****

File Name L52BPAM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2000 AM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1<	1
Stop/Yield			N			N						
Volumes	0	73			30	113				1	1	41
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	73	
Potential Capacity: (pcph)	1272	
Movement Capacity: (pcph)	1272	
Prob. of Queue-free State:	0.96	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		143
Potential Capacity: (pcph)		1465
Movement Capacity: (pcph)		1465
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	216	
Potential Capacity: (pcph)	840	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	840	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	104	
Potential Capacity: (pcph)	922	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	922	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB L	1	922				
WB T	1	840	1249	3.0	A	3.0
WB R	47	1272				

Intersection Delay = 0.5

****

File Name L52BPPM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2000 PM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1<	1
Stop/Yield			N			N						
Volumes	0	154			43	176				0	2	81
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

****

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	154	
Potential Capacity: (pcph)	1157	
Movement Capacity: (pcph)	1157	
Prob. of Queue-free State:	0.92	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		219
Potential Capacity: (pcph)		1348
Movement Capacity: (pcph)		1348
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	373	
Potential Capacity: (pcph)	695	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	695	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	197	
Potential Capacity: (pcph)	814	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	814	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB T	2	695				3.4
WB R	94	1157	1141	3.4	A	

Intersection Delay = 0.6

****

File Name L15BPAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2005 AM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	0	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	0	70	3		187	4	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		3
Potential Capacity: (pcph)		1380
Movement Capacity: (pcph)		1380
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-free State:	0.95	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		73
Potential Capacity: (pcph)		999
Capacity Adjustment Factor due to Impeding Movements		0.95
Movement Capacity: (pcph)		952
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		73
Potential Capacity: (pcph)		961
Major LT, Minor TH Impedance Factor:		0.95
Adjusted Impedance Factor:		0.95
Capacity Adjustment Factor due to Impeding Movements		0.95
Movement Capacity: (pcph)		916

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)		SharedCap Csh(pcph)	Avg.Total Delay		LOS		Delay By App
EB L	217	916	>	917	>	5.2	>	B	
EB T	4	952	>		>		>		5.2
SB L	81	1714			2.2		A		2.1

Intersection Delay = 4.3

****

File Name L15BPPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2005 PM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	0	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	3	83	6		387	3	3			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		6
Potential Capacity: (pcph)		1375
Movement Capacity: (pcph)		1375
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	3	
Potential Capacity: (pcph)	1709	
Movement Capacity: (pcph)	1709	
Prob. of Queue-free State:	0.94	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		92
Potential Capacity: (pcph)		976
Capacity Adjustment Factor due to Impeding Movements		0.94
Movement Capacity: (pcph)		921
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		90
Potential Capacity: (pcph)		939
Major LT, Minor TH Impedance Factor:		0.94
Adjusted Impedance Factor:		0.94
Capacity Adjustment Factor due to Impeding Movements		0.94
Movement Capacity: (pcph)		886

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	448	886	886	8.3	B	
EB T	3	921				8.2
EB R	3	1375		2.6	A	
SB L	96	1709		2.2	A	2.1

Intersection Delay = 7.0

****

File Name L25BPAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2005 AM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1	1
Stop/Yield			N			N						
Volumes	0	187			73	242				0	0	151
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	187	
Potential Capacity: (pcph)	1113	
Movement Capacity: (pcph)	1113	
Prob. of Queue-free State:	0.84	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		315
Potential Capacity: (pcph)		1213
Movement Capacity: (pcph)		1213
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	502	
Potential Capacity: (pcph)	595	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	595	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	260	
Potential Capacity: (pcph)	749	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	749	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB R	175	1113		3.8	A	

Intersection Delay = 0.9

****

File Name L25BPPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2005 PM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1	1
Stop/Yield			N			N						
Volumes	1	382			89	384				0	2	182
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	382	
Potential Capacity: (pcph)	887	
Movement Capacity: (pcph)	887	
Prob. of Queue-free State:	0.76	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		473
Potential Capacity: (pcph)		1020
Movement Capacity: (pcph)		1020
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	856	
Potential Capacity: (pcph)	388	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	388	
Prob. of Queue-free State:	0.99	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	472	
Potential Capacity: (pcph)	564	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	563	

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB T	2	388		9.3	B	5.4
WB R	211	887		5.3	B	
NB L	1	1020		3.5	A	0.0

Intersection Delay = 1.0

****

File Name L35BPAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) Ragsdale Road
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2005 AM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	0	0	0	1>	0<	1
Stop/Yield			N			N						
Volumes		335	1	1	306					7		2
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0			0			0	
MC's (%)		0	0	0	0					0		0
SU/RV's (%)		0	0	0	0					0		0
CV's (%)		0	0	0	0					0		0
PCE's		1.1	1.1	1.1	1.1					1.1		1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	335	
Potential Capacity: (pcph)	937	
Movement Capacity: (pcph)	937	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	336	
Potential Capacity: (pcph)	1186	
Movement Capacity: (pcph)	1186	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	642	
Potential Capacity: (pcph)	450	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	450	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB L	8	450	502	7.3	B	7.3
WB R	2	937				
SB L	1	1186		3.0	A	0.0

Intersection Delay = 0.1

****

File Name L35BPPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) Ragsdale Road
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2005 PM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	0	0	0	1>	0<	1
Stop/Yield			N			N						
Volumes		563	3	2	474					1		1
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0			0			0	
MC's (%)		0	0	0	0					0		0
SU/RV's (%)		0	0	0	0					0		0
CV's (%)		0	0	0	0					0		0
PCE's		1.1	1.1	1.1	1.1					1.1		1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	563	
Potential Capacity: (pcph)	718	
Movement Capacity: (pcph)	718	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	566	
Potential Capacity: (pcph)	921	
Movement Capacity: (pcph)	921	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	1038	
Potential Capacity: (pcph)	265	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	264	

Intersection Performance Summary

Movement		FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB	L	1	264	386	9.4	B	9.4
WB	R	1	718				
SB	L	2	921		3.9	A	0.0

Intersection Delay = 0.0

****

File Name L45BPAM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2005 AM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	0	45	2		132	1	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		2
Potential Capacity: (pcph)		1381
Movement Capacity: (pcph)		1381
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-free State:	0.97	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		47
Potential Capacity: (pcph)		1031
Capacity Adjustment Factor due to Impeding Movements		0.97
Movement Capacity: (pcph)		1000
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		47
Potential Capacity: (pcph)		995
Major LT, Minor TH Impedance Factor:		0.97
Adjusted Impedance Factor:		0.97
Capacity Adjustment Factor due to Impeding Movements		0.97
Movement Capacity: (pcph)		965

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	153	965	965	4.4	A	
EB T	1	1000				4.4
SB L	52	1714		2.2	A	2.1

Intersection Delay = 3.8

****

File Name L45BPPM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2005 PM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		4	0	45	3		161	1	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		3
Potential Capacity: (pcph)		1380
Movement Capacity: (pcph)		1380
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	4	
Potential Capacity: (pcph)	1707	
Movement Capacity: (pcph)	1707	
Prob. of Queue-free State:	0.97	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		52
Potential Capacity: (pcph)		1024
Capacity Adjustment Factor due to Impeding Movements		0.97
Movement Capacity: (pcph)		993
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		52
Potential Capacity: (pcph)		988
Major LT, Minor TH Impedance Factor:		0.97
Adjusted Impedance Factor:		0.97
Capacity Adjustment Factor due to Impeding Movements		0.97
Movement Capacity: (pcph)		958

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	186	958	958	4.7	A	
EB T	1	993				4.7
SB L	52	1707		2.2	A	2.0

Intersection Delay = 4.0

****

File Name L55BPAM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2005 AM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		1>	1	0	0	1<	1	0	0	0	1>	1<	1
Stop/Yield				N			N						
Volumes		0	73			43	121				1	1	44
PHF		.95	.95			.95	.95				.95	.95	.95
Grade			0			0			0			0	
MC's (%)		0	0			0	0				0	0	0
SU/RV's (%)		0	0			0	0				0	0	0
CV's (%)		0	0			0	0				0	0	0
PCE's		1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	73	
Potential Capacity: (pcph)	1272	
Movement Capacity: (pcph)	1272	
Prob. of Queue-free State:	0.96	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		164
Potential Capacity: (pcph)		1432
Movement Capacity: (pcph)		1432
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	237	
Potential Capacity: (pcph)	819	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	819	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	116	
Potential Capacity: (pcph)	907	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	907	

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB L	1	907				
WB T	1	819	1249	3.0	A	3.0
WB R	51	1272				

Intersection Delay = 0.5

****

File Name L55BPPM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2005 PM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1<	1
Stop/Yield			N			N						
Volumes	0	161			46	186				0	3	85
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	161	
Potential Capacity: (pcph)	1148	
Movement Capacity: (pcph)	1148	
Prob. of Queue-free State:	0.91	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		232
Potential Capacity: (pcph)		1329
Movement Capacity: (pcph)		1329
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

tep 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	393	
Potential Capacity: (pcph)	679	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	679	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	207	
Potential Capacity: (pcph)	803	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	803	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB T	3	679				3.5
WB R	98	1148	1125	3.5	A	

Intersection Delay = 0.6

****

File Name L11BPAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 AM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	0	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	0	70	3		192	5	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

****

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		3
Potential Capacity: (pcph)		1380
Movement Capacity: (pcph)		1380
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-free State:	0.95	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		73
Potential Capacity: (pcph)		999
Capacity Adjustment Factor due to Impeding Movements		0.95
Movement Capacity: (pcph)		952
Prob. of Queue-free State:		0.99

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		73
Potential Capacity: (pcph)		961
Major LT, Minor TH Impedance Factor:		0.95
Adjusted Impedance Factor:		0.95
Capacity Adjustment Factor due to Impeding Movements		0.95
Movement Capacity: (pcph)		916

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	222	916	917	5.2	B	
EB T	6	952				5.2
SB L	81	1714		2.2	A	2.1

Intersection Delay = 4.4

****

File Name L11BPPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 PM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	0	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	3	83	6		392	3	3			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		6
Potential Capacity: (pcph)		1375
Movement Capacity: (pcph)		1375
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	3	
Potential Capacity: (pcph)	1709	
Movement Capacity: (pcph)	1709	
Prob. of Queue-free State:	0.94	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		92
Potential Capacity: (pcph)		976
Capacity Adjustment Factor due to Impeding Movements		0.94
Movement Capacity: (pcph)		921
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		90
Potential Capacity: (pcph)		939
Major LT, Minor TH Impedance Factor:		0.94
Adjusted Impedance Factor:		0.94
Capacity Adjustment Factor due to Impeding Movements		0.94
Movement Capacity: (pcph)		886

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	454	886	886	8.4	B	
EB T	3	921				8.3
EB R	3	1375		2.6	A	
SB L	96	1709		2.2	A	2.1

Intersection Delay = 7.1

****

File Name L21BPAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 AM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1	1
Stop/Yield			N			N						
Volumes	0	192			73	248				0	0	152
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	192	
Potential Capacity: (pcph)	1107	
Movement Capacity: (pcph)	1107	
Prob. of Queue-free State:	0.84	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		321
Potential Capacity: (pcph)		1205
Movement Capacity: (pcph)		1205
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	513	
Potential Capacity: (pcph)	587	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	587	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	265	
Potential Capacity: (pcph)	744	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	744	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB R	176	1107		3.9	A	

Intersection Delay = 0.9

****

File Name L21BPPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 PM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1	1
Stop/Yield			N			N						
Volumes	2	392			89	393				0	3	182
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	392	
Potential Capacity: (pcph)	876	
Movement Capacity: (pcph)	876	
Prob. of Queue-free State:	0.76	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		482
Potential Capacity: (pcph)		1010
Movement Capacity: (pcph)		1010
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	876	
Potential Capacity: (pcph)	379	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	378	
Prob. of Queue-free State:	0.99	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	484	
Potential Capacity: (pcph)	555	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	554	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB T	3	378		9.6	B	5.5
WB R	211	876		5.4	B	
NB L	2	1010		3.6	A	0.0

Intersection Delay = 1.0

****

File Name L31BPAM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) Ragsdale Road
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 AM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	0	0	0	1>	0<	1
Stop/Yield			N			N						
Volumes		340	2	1	310					8		3
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0			0			0	
MC's (%)		0	0	0	0					0		0
SU/RV's (%)		0	0	0	0					0		0
CV's (%)		0	0	0	0					0		0
PCE's		1.1	1.1	1.1	1.1					1.1		1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	340	
Potential Capacity: (pcph)	931	
Movement Capacity: (pcph)	931	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	342	
Potential Capacity: (pcph)	1178	
Movement Capacity: (pcph)	1178	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	651	
Potential Capacity: (pcph)	444	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	444	

****

Intersection Performance Summary

Movement		FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB	L	9	444	511	7.2	B	7.2
WB	R	3	931				
SB	L	1	1178		3.1	A	0.0

Intersection Delay = 0.1

****

File Name L31BPPM.HCO
Streets: (N-S) Eagle Mountain Road (E-W) Ragsdale Road
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 PM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	0	0	0	1>	0<	1
Stop/Yield			N			N						
Volumes		567	3	3	478					2		1
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0			0			0	
MC's (%)		0	0	0	0					0		0
SU/RV's (%)		0	0	0	0					0		0
CV's (%)		0	0	0	0					0		0
PCE's		1.1	1.1	1.1	1.1					1.1		1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	567	
Potential Capacity: (pcph)	715	
Movement Capacity: (pcph)	715	
Prob. of Queue-free State:	1.00	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	570	
Potential Capacity: (pcph)	917	
Movement Capacity: (pcph)	917	
Prob. of Queue-free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	1048	
Potential Capacity: (pcph)	262	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	261	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB L	2	261	331	11.0	C	11.0
WB R	1	715				
SB L	3	917		3.9	A	0.0

Intersection Delay = 0.0

File Name L41BPAM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 AM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		0	0	49	3		143	2	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		3
Potential Capacity: (pcph)		1380
Movement Capacity: (pcph)		1380
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-free State:	0.97	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		52
Potential Capacity: (pcph)		1024
Capacity Adjustment Factor due to Impeding Movements		0.97
Movement Capacity: (pcph)		990
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		52
Potential Capacity: (pcph)		988
Major LT, Minor TH Impedance Factor:		0.97
Adjusted Impedance Factor:		0.97
Capacity Adjustment Factor due to Impeding Movements		0.97
Movement Capacity: (pcph)		955

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	166	955	955	4.6	A	
EB T	2	990				4.6
SB L	57	1714		2.2	A	2.0

Intersection Delay = 3.9

****

File Name L41BPPM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 EB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 PM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1<	1	1>	1	0	1>	1	1	0	0	0
Stop/Yield			N			N						
Volumes		5	0	48	4		170	2	0			
PHF		.95	.95	.95	.95		.95	.95	.95			
Grade		0			0			0			0	
MC's (%)		0	0	0	0		0	0	0			
SU/RV's (%)		0	0	0	0		0	0	0			
CV's (%)		0	0	0	0		0	0	0			
PCE's		1.1	1.1	1.1	1.1		1.1	1.1	1.1			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		4
Potential Capacity: (pcph)		1378
Movement Capacity: (pcph)		1378
Prob. of Queue-free State:		1.00

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	5	
Potential Capacity: (pcph)	1705	
Movement Capacity: (pcph)	1705	
Prob. of Queue-free State:	0.97	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:	0.00	

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)		57
Potential Capacity: (pcph)		1018
Capacity Adjustment Factor due to Impeding Movements		0.97
Movement Capacity: (pcph)		985
Prob. of Queue-free State:		1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		57
Potential Capacity: (pcph)		981
Major LT, Minor TH Impedance Factor:		0.97
Adjusted Impedance Factor:		0.97
Capacity Adjustment Factor due to Impeding Movements		0.97
Movement Capacity: (pcph)		949

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
EB L	197	949	949	4.8	A	
EB T	2	985				4.8
SB L	56	1705		2.2	A	2.0

Intersection Delay = 4.1

****

File Name L51BPAM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 AM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1<	1
Stop/Yield			N			N						
Volumes	0	73			47	131				2	2	47
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

****

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	73	
Potential Capacity: (pcph)	1272	
Movement Capacity: (pcph)	1272	
Prob. of Queue-free State:	0.96	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		178
Potential Capacity: (pcph)		1410
Movement Capacity: (pcph)		1410
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	251	
Potential Capacity: (pcph)	806	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	806	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	120	
Potential Capacity: (pcph)	902	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	902	

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB L	2	902				
WB T	2	806	1230	3.1	A	3.1
WB R	54	1272				

Intersection Delay = 0.5

****

File Name L51BPPM.HCO
Streets: (N-S) Desert Ctr/Rice Rd (E-W) I-10 WB Ramps
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... RPH
Date of Analysis..... 11/30/95
Other Information..... 2010 PM Base + Project Volumes

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1>	1	0	0	1<	1	0	0	0	1>	1<	1
Stop/Yield			N			N						
Volumes	0	169			49	198				0	3	89
PHF	.95	.95			.95	.95				.95	.95	.95
Grade		0			0			0			0	
MC's (%)	0	0			0	0				0	0	0
SU/RV's (%)	0	0			0	0				0	0	0
CV's (%)	0	0			0	0				0	0	0
PCE's	1.1	1.1			1.1	1.1				1.1	1.1	1.1

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

WorkSheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	169	
Potential Capacity: (pcph)	1137	
Movement Capacity: (pcph)	1137	
Prob. of Queue-free State:	0.91	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		247
Potential Capacity: (pcph)		1307
Movement Capacity: (pcph)		1307
Prob. of Queue-free State:		1.00
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-free State:		0.00

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	416	
Potential Capacity: (pcph)	660	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	660	
Prob. of Queue-free State:	1.00	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	218	
Potential Capacity: (pcph)	792	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	792	

****

Intersection Performance Summary

Movement	FlowRate v(pcph)	MoveCap Cm(pcph)	SharedCap Csh(pcph)	Avg.Total Delay	LOS	Delay By App
WB T	3	660				3.6
WB R	103	1137	1114	3.6	A	

Intersection Delay = 0.6

Appendix E
Air Quality Impact Section for the Eagle Mountain Landfill and Recycling Center

sierra research

DRAFT EIS/EIR

APPENDIX E

Air Quality Impact Section for the Eagle Mountain Landfill and Recycling Center

prepared for:

Mine Reclamation Corporation

June 1996

prepared by:

Sierra Research, Inc.
1801 J Street
Sacramento, California 95814
(916) 444-6666

DRAFT EIS/EIR

APPENDIX E

Air Quality Impact Section for the Eagle Mountain Landfill and Recycling Center

prepared for:

Mine Reclamation Corporation

June 1996

Sierra Research, Inc.
1801 J Street
Sacramento CA 95814
(916) 444-6666

APPENDIX E

Air Quality Impact Section for the Eagle Mountain Landfill and Recycling Center

Table of Contents

page

Part 1 Summary 1-1

1.1 Introduction 1-1

1.2 Environmental Setting 1-1

1.2.1 Geography and Topography 1-1
1.2.2 Climate and Meteorology 1-1
1.2.3 Air Quality Trends 1-4
1.2.4 Other Air Quality Issues 1-7
1.2.5 Regulatory Setting 1-10

1.3 Significance Criteria 1-11

1.4 Project Emissions and Impacts 1-11

1.4.1 Construction Emissions 1-12
1.4.2 Operation Emissions 1-13
1.4.3 Project Impacts 1-14
1.4.4 Impacts at Joshua Tree National Park 1-17
1.4.4.1 Regional Haze 1-17
1.4.4.2 Acid Deposition 1-17
1.4.4.3 Vegetation 1-19
1.4.4.4 Visibility 1-20
1.4.4.5 Prevention of Significant Deterioration 1-21
1.4.5 Consistency with Regulatory Programs 1-21
1.4.6 Mitigation Measures 1-22
1.4.7 Project Impacts with Mitigation 1-24
1.4.8 Assessment of Significance 1-24

1.5 Alternatives 1-26

1.5.1 Reduced Volume Alternative 1-26
1.5.2 Rail Access Only Alternative 1-26

Table of Contents continued...

page

1.5.3 Alternative Road Alignment Alternative 1-27
1.5.4 Landfill on Kaiser Land Only Alternative 1-27
1.5.5 No Townsite Alternative 1-27
1.5.6 No Project Alternative 1-27

1.6 Comparison of Alternatives 1-27

1.7 Cumulative Impacts 1-34

1.7.1 Local Projects 1-34
1.7.2 Regional Projects 1-34

Part 2 Environmental Setting 2-1

2.1 Geography and Topography 2-1

2.1.1 Southeast Desert Air Basin 2-1
2.1.2 Joshua Tree National Park 2-5
2.1.3 South Coast Air Basin 2-5
2.1.4 South Central Coast Air Basin 2-6
2.1.5 San Diego Air Basin 2-6

2.2 Climate and Meteorology 2-7

2.2.1 Southeast Desert Air Basin 2-9
2.2.2 Joshua Tree National Park 2-11
2.2.3 South Coast Air Basin 2-11
2.2.4 South Central Coast Basin 2-12
2.2.5 San Diego Air Basin 2-13

2.3 Existing Air Quality - Overview 2-13

2.4 Criteria Pollutants - Air Quality Trends 2-14

2.4.1 Ozone 2-14
2.4.2 Nitrogen Dioxide 2-25
2.4.3 Carbon Monoxide 2-35
2.4.4 Sulfur Dioxide 2-45
2.4.5 Suspended Sulfates 2-53
2.4.6 Fine Particulate 2-61

Table of Contents continued...

page

2.5 Other Air Quality Issues 2-71

2.5.1 Regional Visibility 2-71
2.5.2 Acid Deposition 2-76
2.5.3 Toxic Air Pollutants 2-77
2.5.4 Interbasin Transport 2-79
2.5.5 Global Warming 2-83

2.6 Regulatory Setting 2-87

2.6.1 Federal Prevention of Significant Deterioration Program 2-88
2.6.2 Federal New Source Performance Standards 2-89
2.6.3 National Emissions Standards for Hazardous Air Pollutants . . . 2-89
2.6.4 Federal Clean Air Act Amendments of 1990 2-89
2.6.5 Federal Conformity Requirements 2-90
2.6.6 California Clean Air Act 2-90
2.6.7 SCAQMD New Source Review Requirements 2-91
2.6.8 Other SCAQMD Regulatory Requirements 2-93
2.6.9 South Coast Air Quality Management Plan 2-97

Part 3 Significance Criteria 3-1

3.1 Introduction 3-1

3.2 Measures Used for the Evaluation of Industrial Sources 3-1

3.3 Limits of Detection, Accuracy and Reportability 3-2

3.4 Measures Used in Areas with Severe Air Quality Problems 3-3

3.5 Measures Used for Visibility Protection 3-10

Part 4 Proposed Project 4-1

4.1 Introduction 4-1

4.2 Emissions - Initial Construction 4-2

4.3 Emissions - Operation 4-2

Table of Contents continued...

page

4.3.1 Solid Waste Transport 4-2
4.3.2 On-Site Material Handling (Except Fugitive Dust) 4-3
4.3.3 Landfill Gas Generation and Combustion 4-6
4.3.4 Fugitive Dust 4-9
4.3.5 Miscellaneous Sources 4-11
4.3.6 Townsite 4-12

4.4 Project Impacts (Without Mitigation) 4-13

4.4.1 Total Project Emissions 4-13
4.4.2 Project Impacts Near Proposed Project 4-14
4.4.3 Impacts at Typical Rail Crossing 4-16
4.4.4 Impacts on Joshua Tree National Park 4-16
4.4.5 Cumulative Impacts at the Project Site 4-17

4.5 Consistency with Regulatory Programs 4-17

4.5.1 Consistency with Federal Requirements 4-17
4.5.2 Consistency with Local Requirements 4-20

4.6 Mitigation 4-28

4.6.1 Existing Requirements 4-28
4.6.1.1 Truck Emission 4-28
4.6.1.2 Landfill Equipment Emissions 4-30
4.6.1.3 Landfill Gas Generation and Flare Emissions 4-30
4.6.1.4 Fugitive Dust 4-31
4.6.1.5 Miscellaneous Sources 4-33
4.6.2 Additional Mitigation Measures 4-34
4.6.2.1 Locomotive Emissions 4-34
4.6.2.2 Landfill Equipment Emissions 4-42
4.6.2.3 Energy Recovery Facilities 4-46
4.6.2.4 Air Quality Monitoring Program 4-48
4.6.3 Mitigation Measures Recommended for Project Approval 4-49
4.6.4 Measures Not Currently Feasible 4-55

4.7 Project Impacts (With Mitigation) 4-56

4.7.1 Total Project Emissions 4-56
4.7.2 Effects of Mitigation 4-56
4.7.3 Ambient Impacts Near Landfill Site 4-59
4.7.4 Impacts at a Typical Rail Crossing 4-61
4.7.5 Impacts on Joshua Tree National Park 4-61

page

4.7.6 Cumulative Impacts at the Project Site 4-62

4.8 Assessment of Significance 4-62

4.8.1 Significance Comparison Tables 4-62
4.8.2 Regional Visibility 4-68
4.8.3 Acid Deposition 4-68
4.8.4 Toxic Air Pollutants 4-68
4.8.5 Global Warming 4-68
4.8.6 Overall Assessment of Significance 4-69

Part 5 - Alternatives 5-1

5-1 Reduced Volume Alternative 5-1

5.1.1 Introduction 5-1
5.1.2 Emissions - Initial Construction 5-1
5.1.3 Emissions - Operation 5-1
5.1.3.1 Solid Waste Transport 5-1
5.1.3.2 On-Site Material Handling (except Fugitive Dust) 5-2
5.1.3.3 Landfill Gas Generation and Combustion 5-2
5.1.3.4 Fugitive Dust 5-2
5.1.3.5 Miscellaneous Sources 5-3
5.1.3.6 Townsite 5-3
5.1.4 Project Impacts (Without Mitigation) 5-3
5.1.4.1 Total Project Emissions 5-3
5.1.4.2 Ambient Impacts Near Landfill Site 5-3
5.1.4.3 Impacts at a Typical Rail Crossing 5-6
5.1.4.4 Impacts on Joshua Tree National Park 5-6
5.1.4.5 Cumulative Impacts at the Project Site 5-6
5.1.5 Consistency with Regulatory Programs 5-6
5.1.5.1 Consistency with Federal Regulations 5-6
5.1.5.2 Consistency with Local Requirements 5-7
5.1.6 Mitigation 5-8
5.1.7 Project Impacts (With Mitigation) 5-9
5.1.7.1 Total Project Emissions 5-9
5.1.7.2 Effects of Mitigation 5-9
5.1.7.3 Ambient Impacts Near Landfill Site 5-12
5.1.7.4 Impacts at a Typical Rail Crossing 5-12
5.1.7.5 Impacts on Joshua Tree National Park 5-12
5.1.7.6 Cumulative Impacts at the Project Site 5-13
5.1.8 Assessment of Significance 5-14
5.1.8.1 Significance Comparison Tables 5-14

Table of Contents continued...

page

5.1.8.2 Regional Visibility 5-20
5.1.8.3 Acid Deposition 5-20
5.1.8.4 Toxic Air Pollutants 5-20
5.1.8.5 Global Warming 5-20
5.1.8.6 Overall Assessment of Significance 5-21

5.2 Rail Access Only Alternative 5-21
5.2.1 Introduction 5-21
5.2.2 Emissions - Initial Construction 5-21
5.2.3 Emissions - Operation 5-21
5.2.3.1 Solid Waste Transport 5-21
5.2.3.2 On-Site Material Handling (except Fugitive Dust) 5-22
5.2.3.3 Landfill Gas Generation and Combustion 5-22
5.2.3.4 Fugitive Dust 5-22
5.2.3.5 Miscellaneous Sources 5-22
5.2.3.6 Townsite 5-22
5.2.4 Project Impacts (Without Mitigation) 5-24
5.2.4.1 Total Project Emissions 5-24
5.2.4.2 Ambient Impacts Near Landfill Site 5-24
5.2.4.3 Impacts at a Typical Rail Crossing 5-24
5.2.4.4 Impacts on Joshua Tree National Park 5-24
5.2.4.5 Cumulative Impacts at the Project Site 5-25
5.2.5 Consistency with Regulatory Programs 5-25
5.2.5.1 Consistency with Federal Requirements 5-25
5.2.5.2 Consistency with Local Requirements 5-26
5.2.6 Mitigation 5-28
5.2.7 Project Impacts (With Mitigation) 5-28
5.2.7.1 Total Project Emissions 5-28
5.2.7.2 Effects of Mitigation 5-30
5.2.7.3 Ambient Impacts near Landfill Site 5-30
5.2.7.4 Impacts at a Typical Rail Crossing 5-32
5.2.7.5 Impacts on Joshua Tree National Park 5-33
5.2.7.6 Cumulative Impacts at the Project Site 5-33
5.2.8 Assessment of Significance 5-33
5.2.8.1 Significance Comparison Tables 5-33
5.2.8.2 Regional Visibility 5-39
5.2.8.3 Acid Deposition 5-39
5.2.8.4 Toxic Air Pollutants 5-39
5.2.8.5 Global Warming 5-39
5.2.8.6 Overall Assessment of Significance 5-40

5.3 Alternate Road Alignment Alternative 5-40

page

5.3.1 Introduction 5-40
5.3.2 Emissions - Initial Construction 5-40
5.3.3 Emissions - Operation 5-41
5.3.3.1 Solid Waste Transport 5-41
5.3.3.2 On-Site Material Handling (except Fugitive Dust) 5-41
5.3.3.3 Landfill Gas Generation and Combustion 5-41
5.3.3.4 Fugitive Dust 5-41
5.3.3.5 Miscellaneous Sources 5-41
5.3.3.6 Townsite 5-41
5.3.4 Project Impacts (Without Mitigation) 5-43
5.3.4.1 Total Project Emissions 5-43
5.3.4.2 Ambient Impacts Near the Landfill Site 5-43
5.3.4.3 Impacts at a Typical Rail Crossing 5-43
5.3.4.4 Impacts on Joshua Tree National Park 5-43
5.3.4.5 Cumulative Impacts at the Project Site 5-43
5.3.5 Consistency with Regulatory Programs 5-43
5.3.5.1 Consistency with Federal Requirements 5-43
5.3.5.2 Consistency with Local Requirements 5-44
5.3.6 Mitigation 5-45
5.3.7 Project Impacts (With Mitigation) 5-46
5.3.7.1 Total Project Emissions 5-46
5.3.7.2 Effects of Mitigation 5-46
5.3.7.3 Ambient Impacts Near Landfill Site 5-49
5.3.7.4 Impacts at a Typical Rail Crossing 5-49
5.3.7.5 Impacts on Joshua Tree National Park 5-49
5.3.7.6 Cumulative Impacts at the Project Site 5-49
5.3.8 Assessment of Significance 5-50
5.3.8.1 Significance Comparison 5-50
5.3.8.2 Regional Visibility 5-50
5.3.8.3 Acid Deposition 5-56
5.3.8.4 Toxic Air Pollutants 5-56
5.3.8.5 Global Warming 5-56
5.3.8.6 Overall Assessment of Significance 5-56

5.4 Landfill on Kaiser Land Only Alternative 5-57

5.5 No Townsite Alternative 5-57

5.6 No Project Alternative 5-57

5.6.1 Introduction 5-57
5.6.2 Emissions - Operation 5-58
5.6.2.1 Solid Waste Transport 5-58

page

5.6.2.2 Landfill Gas Flares 5-58
5.6.2.3 Onsite Mobile Equipment 5-60
5.6.2.4 Fugitive Dust 5-60
5.6.3 Total Project Emissions 5-60
5.6.4 Project Impacts 5-62
5.6.5 Consistency with Regulatory Programs 5-62
5.6.6 Mitigation 5-62
5.6.7 Assessment of Significance 5-62
5.6.7.1 Significance Comparison 5-62
5.6.7.2 Regional Visibility 5-62
5.6.7.3 Acid Deposition 5-63
5.6.7.4 Toxic Air Pollutants 5-63
5.6.7.5 Global Warming 5-63
5.6.7.6 Overall Assessment of Significance 5-63

Part 6 Joshua Tree National Park Air Quality Impact Analysis 6-1

6.1 Introduction 6-1

6.2 Regional Haze Analysis 6-1

6.3 Acid Deposition Analysis 6-3

6.3.1 Impact on Vegetation 6-6

6.4 Visibility Analysis 6-10

6.4.1 Optics Calculations 6-10
6.4.2 Site Location and Source Scenarios 6-10
6.4.3 Modeling Domain Geometry 6-12
6.4.4 Meteorological Data 6-15
6.4.5 Pollutant Characterization 6-16
6.4.6 Results of Visibility Analysis 6-16
6.4.7 Visibility Impacts of Alternatives 6-20

6.5 Criteria Pollutant Impacts 6-21

6.5.1 Emission Sources Analyzed 6-22
6.5.2 Meteorological Data Base 6-22
6.5.3 Choice of Models 6-22
6.5.4 Receptors 6-22
6.5.5 Program Control Parameters/Source Characteristics 6-22
6.5.6 Results of Criteria Pollutant Impact Analysis 6-22

Table of Contents continued...

page

Part 7 Comparison of Alternatives 7-1

7.1 Introduction 7-1

7.2 Rail Emissions 7-1

7.3 Transfer Truck Emissions 7-2

7.4 Emission Comparison 7-2

Part 8 Cumulative Impacts 8-1

8.1 Local Projects 8-1

8.1.1 Proposed Project Without Mitigation 8-1
8.1.2 Proposed Project With Mitigation 8-5
8.1.3 Reduced Volume Alternative Without Mitigation 8-5
8.1.4 Reduced Volume Alternative With Mitigation 8-8
8.1.5 Rail Access Only Alternative Without Mitigation 8-8
8.1.6 Rail Access Only Alternative With Mitigation 8-8
8.1.7 Alternate Road Alignment Alternative Without Mitigation 8-8
8.1.8 Alternate Road Alignment Alternative With Mitigation 8-13
8.1.9 Other Alternatives 8-13

8.2 Proposed Regional Projects 8-14

8.2.1 Mesquite Regional Landfill 8-14
8.2.2 Rail Cycle - Bolo Station, San Bernardino County 8-17
8.2.3 La Paz County Regional Landfill 8-18

8.3 Evaluation of Cumulative Regional Impacts 8-19

References

Attachment A - Detailed Emissions Calculations
Attachment B - Initial Construction of Proposed Project
Attachment C - Screening Level Health Risk Assessment
Attachment D - Air Dispersion Modeling

PART 1
SUMMARY

1.1 Introduction

This section provides an overview of the air quality impacts for the proposed Eagle Mountain Landfill and Recycling Center. Included in this summary is an overview of the environmental setting; the significance criteria used; a description of the Proposed Project including emissions, mitigation measures and project impacts; an impact analysis and comparison of alternatives to the Project; and the cumulative impacts of local and proposed regional projects.

1.2. Environmental Setting

1.2.1 Geography and Topography

The landfill site is located in northeastern Riverside County and is bordered on the north by the northeastern ridge on the Eagle Mountains, on the east by Chuckwalla Valley, on the South by the townsite community of Eagle Mountain and on the west by the Eagle Mountains. Joshua Tree National Park is approximately 1.5 miles north and southwest of the Project Site.

The Project Site is located in the Southeast Desert Air Basin (SEDAB), which is composed of the eastern parts of San Bernardino, Riverside, Kern, and Los Angeles Counties, and all of Imperial County. Figure 1-1 shows the SEDAB boundaries relative to the Project Site.

1.2.2 Climate and Meteorology

The SEDAB contains some of the hottest and driest areas of California. The seasons are generally marked by differences in temperature rather than substantial differences in rainfall. Average monthly temperatures at Eagle Mountain range from about 54°F in January to 94°F in July. The average monthly high temperature ranges from over 65°F in January to about 105°F in July, while the main monthly low temperature ranges from about 45°F in January to about 83°F in July. Average annual precipitation for the Project Site totals about 3.8 inches.

Wind patterns in the area of the site can be seen in Figure 1-2 which is a wind rose for the on-site weather station. Westerly winds predominate at the Project Site. Winds are typically persistent; about 9 percent of the winds are from due west, and almost 22

Figure 1-1

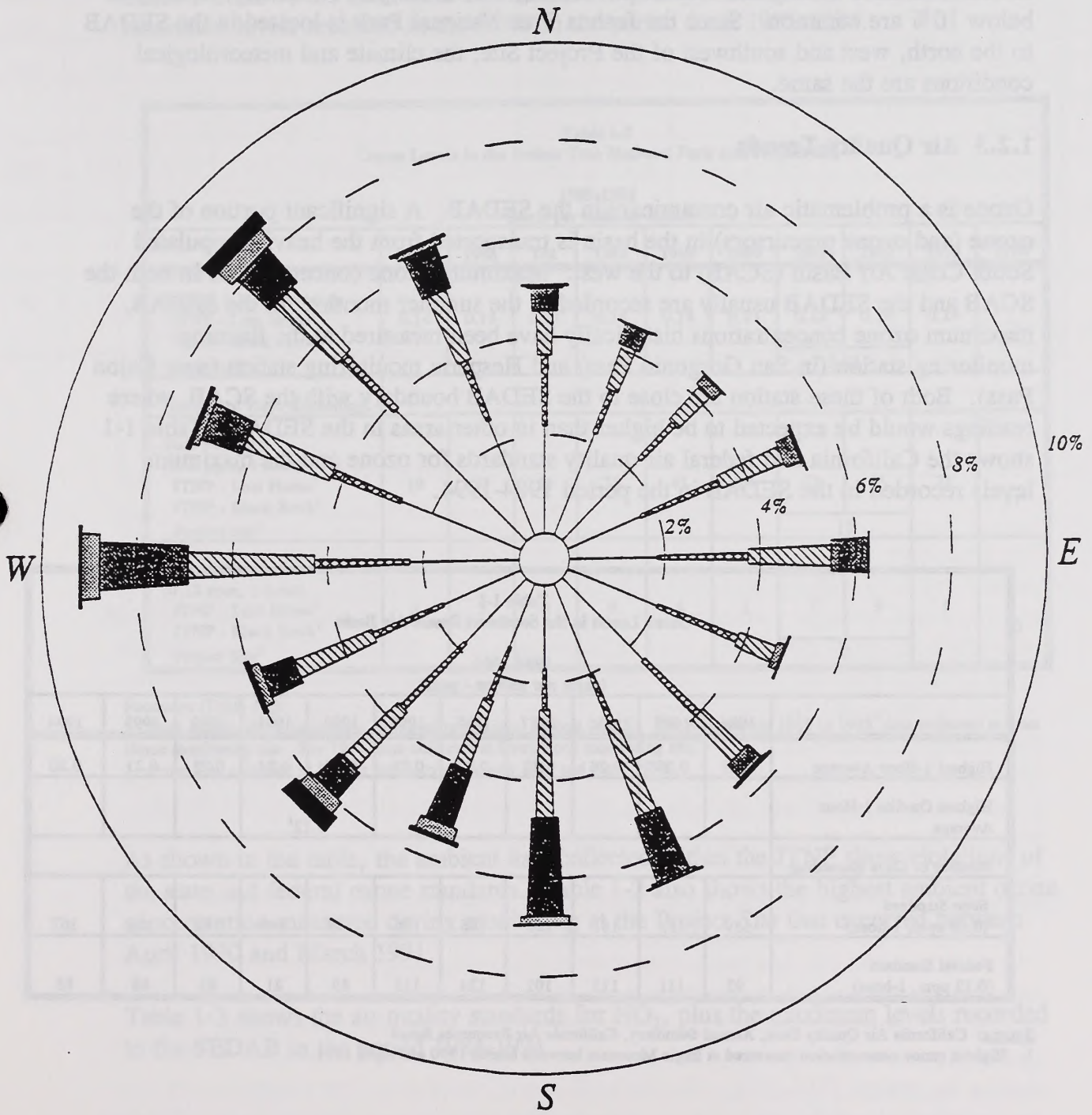
Map of Region

Figure 1-2

Wind Patterns

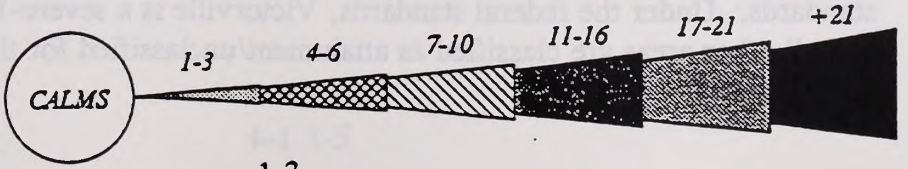
Eagle Mtn 1990-91 Set 2

January 1-December 31; Midnight-11 PM



CALM WINDS 0.00%

WIND SPEED (KNOTS)



NOTE: Frequencies indicate direction from which the wind is blowing.

percent come from the west-southwest through west-northwest. On the average, 20-30 frontal systems move into the northern part of the basin each winter. Most of the precipitation received in the SEDAB is associated with this winter frontal activity. The relative humidity in summer is very low, averaging 30% to 50% in early morning and 10% to 20% during late afternoon. During the hottest part of the day, humidities below 10% are common. Since the Joshua Tree National Park is located in the SEDAB to the north, west and southwest of the Project Site, the climate and meteorological conditions are the same.

1.2.3 Air Quality Trends

Ozone is a problematic air contaminant in the SEDAB. A significant portion of the ozone (and ozone precursors) in the basin is transported from the heavily populated South Coast Air Basin (SCAB) to the west. Maximum ozone concentrations in both the SCAB and the SEDAB usually are recorded in the summer months. In the SEDAB, maximum ozone concentrations historically have been measured at the Banning monitoring station (in San Gorgonio Pass) and Hesperia monitoring station (near Cajon Pass). Both of these station are close to the SEDAB boundary with the SCAB, where readings would be expected to be higher than in other areas in the SEDAB. Table 1-1 shows the California and federal air quality standards for ozone and the maximum levels recorded in the SEDAB in the period 1984-1994.

Table 1-1
Ozone Levels in the Southeast Desert Air Basin

1984-1994
(parts per million - ppm)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Highest 1-Hour Average	0.25	0.24	0.24	0.22	0.24	0.23	0.22	0.24	0.23	0.21	0.20
Highest On-Site 1-Hour Average							0.12[1]				
Number of Days Exceeding											
State Standard (0.09 ppm, 1-hour)	159	159	161	166	188	176	149	149	167	165	167
Federal Standard (0.12 ppm, 1-hour)	92	111	115	101	124	111	89	81	85	88	88

Source: California Air Quality Data, Annual Summary, California Air Resources Board
1. Highest ozone concentration measured at Eagle Mountain between March 1990 and April 1991.

The SEDAB is classified as a severe nonattainment area for ozone under the state standards. Under the federal standards, Victorville is a severe-17 nonattainment area and all other areas are classified as attainment/unclassified for the federal ozone

standards. The Project Site is located in an area classified as attainment/unclassified for the federal ozone standards.

Ozone is also a problematic air contaminant in the Joshua Tree National Park (JTNP). Table 1-2 shows the California and federal air quality standards for ozone and the maximum levels recorded in the JTNP in the period from 1985-1994.

Table 1-2
Ozone Levels in the Joshua Tree National Park and Project Site

1985-1994
(parts per million - ppm)

	1989	1986	198	1988	1989	1990	1991	1992	1993	1993
Highest 1-Hour Average										
JTNP - Lost Horse[1]	0.14	0.16	0.14	0.14	0.14	0.13	0.13	0.14	0.14	0.17
JTNP - Black Rock[1]										
Project Site[2]							0.12			
Number of Days Exceeding										
State Standard										
(0.09 ppm, 1-hour)										
JTNP - Lost Horse[1]	19	41	55	36	41	29	53	55	21	77
JTNP - Black Rock[1]										
Project Site[2]							17			
Federal Standard										
(0.12 ppm, 1-hour)										
JTNP - Lost Horse[1]	3	3	0	9	4	1	7	9	1	20
JTNP - Black Rock[1]										
Project Site[2]							0			

Footnotes (Table 1-2):
1. Data source, EPA Aerometric Information Retrieval System (AIRS). For period from 1985 to 1993, data collected at Lost Horse monitoring site. For 1994, data collected at Black Rock monitoring site.
2. From data collected at Project Site between March 1990 and April 1991.

As shown in the table, the ambient data collected within the JTNP show violations of the state and federal ozone standards. Table 1-2 also shows the highest ambient ozone concentration measured during monitoring at the Project Site that occurred between April 1990 and March 1991.

Table 1-3 shows the air quality standards for NO_2, plus the maximum levels recorded in the SEDAB in the period 1984-1994.

Table 1-3
Nitrogen Dioxide Levels in the Southeast Desert Air Basin
(Worst Case)

1984-1994
(parts per million - ppm)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Highest 1-Hour Average	0.16	0.14	0.15	0.13	0.11	0.12	0.19	0.25	0.24	0.36	0.23
Highest On-Site 1-Hour Average							0.04[1]				
Annual Average	0.017	0.018	0.015	0.017	0.016	0.019	0.020	0.020	0.018	0.016	0.021
On-Site Annual Average							0.003[2]				
Number of Days Exceeding State Std (0.25 ppm, 1-hr	0	0	0	0	0	0	0	0	0	1	0
Exceeds the Federal Standard? (0.053 Ann. Avg.)	N	N	N	N	N	N	N	N	N	N	N

Source: California Air Quality Data, Annual Summary, California Air Resources Board
1. Highest NO_2 concentration measured at Eagle Mountain between March 1990 and April 1991.
2. Annual average NO_2 concentration measured at Eagle Mountain between March 1990 and April 1991.

The data show that NO_2 concentrations have been below the 1993 federal standards for several years. Table 1-3 also shows the highest one-hour ambient NO_2 concentration and the annual average concentration measured during on-site monitoring that occurred between April 1990 and March 1991 at the Project Site. While there was an increase in NO_2 concentrations between 1990 and 1993, the increase occurred at the northern boundary of San Bernardino County near Trona, suggesting that the readings may be due to pollutant transport from the San Joaquin Valley through the Tehachapi Pass or from the SCAB through the Soledad Canyon and Cajon Pass. The NO_2 readings at Palm Springs and Twenty-Nine Palms, which are west and northwest of the Project Site, are less than one-half of the state NO_2 standard. Although no ambient NO_2 monitoring data are available for JTNP, it is expected that the levels would be between the worst-case levels shown for the SEDAB and those measured at the Project Site.

The state standard for fine particulate matter (PM_{10}) has been exceeded about 50 days per year and the federal standard has been exceeded fewer than 10 days per year in the SEDAB. Table 1-4 shows the California and federal air quality standards for fine particulate, as well as the maximum and second-highest levels recorded in the SEDAB during the period 1984-1994. The SEDAB is considered a serious nonattainment area for the purposes of the State PM_{10} standard. The Imperial and Searles Valley Planning Areas of the SEDAB are considered serious PM_{10} nonattainment areas.

Table 1-4
Fine Particulate (PM_{10}) Levels in Southeast Desert Air Basin

1984-1994
(micrograms per cubic meter - $\mu g/m^3$)

	1984	1989	1986	1987	1988	1989	1990	1991	1992	1993	1994
Highest 24-Hour Average	60	496	230	171	368	712	520	780	242	175	258
2nd-highest 24-Hour Average	60	358	191	163	192	676	462	534	175	166	182
On-site Highest 24-Hour Average							210.4[1]				
Annual Geometric Mean * (State Standard = 30 $\mu g/m^3$)	47.3	59.3	59.3	65.2	58.6	66.4	64.9	59.8	43.7	47.2	45.3
On-site Annual Geometric Mean *							21.7[2]				
Annual Arithmetic Mean * (Federal Standard = 50 $\mu g/m^3$)	39.5	70.9	64.1	75.8	66.2	90.3	79.3	63.1	47.3	52.4	48.7
On-site Annual Arithmetic Mean *							29.8[2]				
Number of Days Exceeding State Std (50 $\mu g/m^3$, 24-hr)	6	57	54	56	56	63	64	58	43	47	65
Federal Std (150 $\mu g/m^3$, 24-hr)	0	6	2	3	2	9	7	7	2	3	4

Source: California Air Quality Data, Annual Summary, California Air Resources Board
* No basinwide summary available. The annual mean for each year is based on the station with the highest annual mean in the basin.
1. Highest 24-hour PM_{10} concentration measured at Eagle Mountain between March 1990 and April 1991.
2. Annual average PM_{10} concentration measured at Eagle Mountain between March 1990 and April 1991.

Also shown in Table 1-4 are the highest 24-hour and the annual average PM_{10} concentrations measured on-site during monitoring that occurred between April 1990 and March 1991 at the Project Site. Again, because no monitoring data has been collected in the JTNP, levels for the JTNP are expected to be between the worst-case levels shown in Table 1-4 for the SEDAB and those measured at the Project Site.

Carbon monoxide (CO) and sulfur dioxide levels in the SEDAB are below the state and federal standard. The SEDAB is considered an attainment area for CO and SO_2 for the purpose of state and federal air quality planning.

1.2.4 Other Air Quality Issues

Other air quality issues related to the Proposed Project that are of concern are regional visibility, acid deposition, toxic air pollutants, and inter-basin pollutant transport. In addition, concern has been expressed over plume visibility impacts from the Project flares. These impacts are addressed in the Joshua Tree National Park impact analysis.

Visibility in the SEDAB improves as you move from west to east. Midday visibilities near the urbanized western edge of the air basin average 15 miles, while in the remote desert regions at the east end of the basin, average visibilities approach 70 miles. In the absence of large cities or industrial complexes, the greatest contribution to visibility degradation is made by the transport of aerosols from the South Coast and San Joaquin Valley Air Basins. Because the JTNP is located in the desert region of the SEDAB, visibilities are at the higher end of the range. Studies conducted by Colorado State University show that the best 10 percent of winter Background Visual Ranges (BVRs) in the JTNP are approximately 112 miles, while the best 10 percent of summer BVRs in the JTNP are approximately 76 miles.

California does not have the acid deposition problems experienced in the eastern United States. Although chronically acidified lakes or streams have not been found in California, there are California lake watersheds in the high elevations of the Sierra Nevada that have low acid-neutralizing capacity and suffer from episodic, rather that chronic, acidification. In addition, because of its limited annual precipitation compared to the eastern states, California experiences less acid rain. Acid fog is more common in California and is typically 100 times more acidic than acid rain. In California, acid fog occurs in urban coastal areas and in the southern San Joaquin Valley. Dry deposition of gases and particles does occur in southern California, however, most acidic deposition, both wet and dry, occur in urban coastal sites.

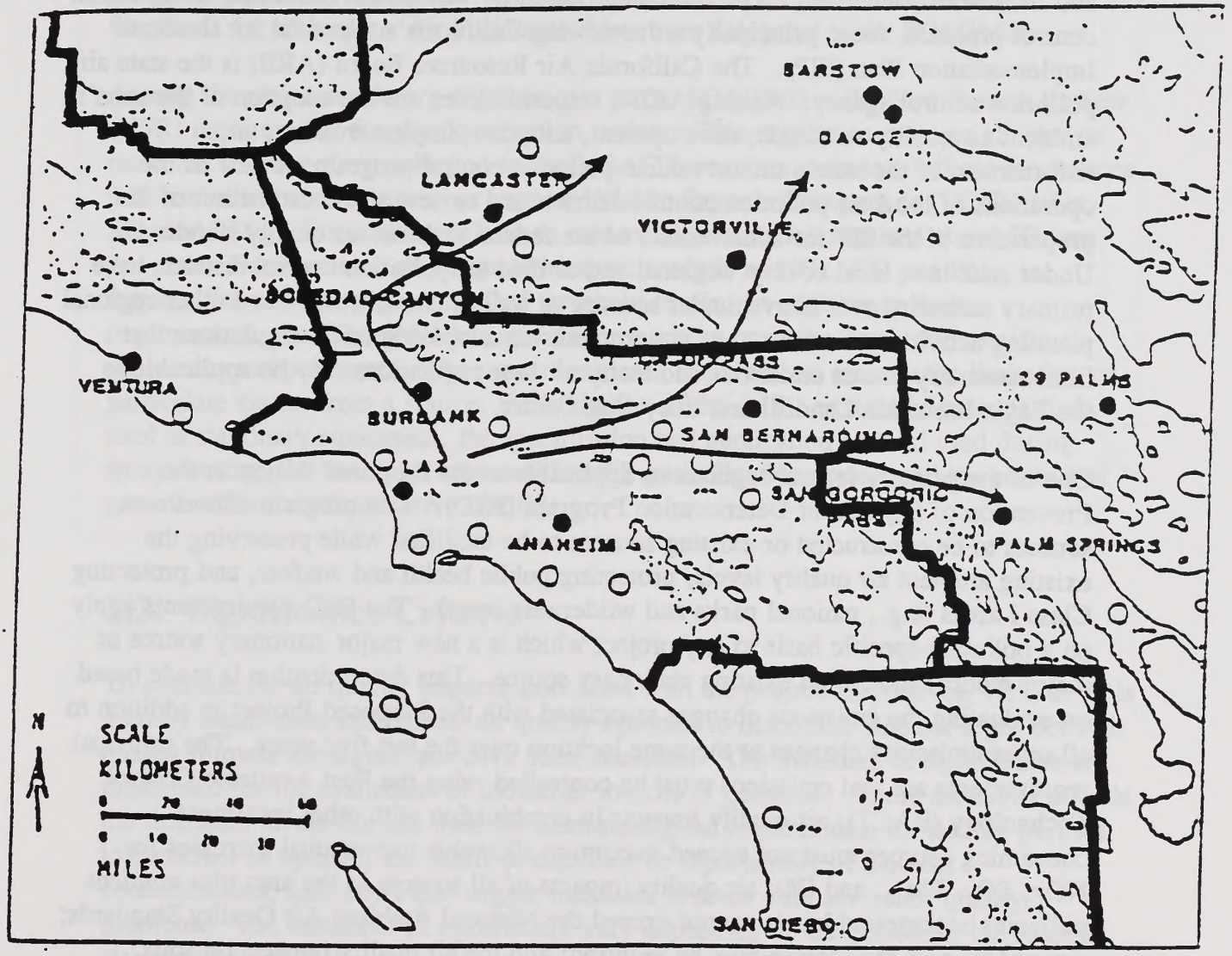
The preponderance of emissions of toxic air contaminants in California occurs in the SCAB (51%) based on the submittal of initial inventories and risk assessments required under state law (Assembly Bill 2588, Toxics "Hot Spots" Information and Assessment Act). Efforts are currently underway to characterize the emissions and health risks associated with small business area sources, such as gas stations and dry cleaners. A large reduction in air toxics emissions has already occurred in California through the state's Toxic Air Contaminant Control Program (AB1807). Regulations implemented under this program include the control of emissions from dry cleaners, cooling towers, chrome plating operations, ethylene oxide sterilizers and gasoline service stations.

There is substantial pollutant transport from the SCAB to the SEDAB. The three major transport corridors between the two basins are the Soledad Canyon, Cajon Pass and the San Gorgonio Pass. Figure 1-3 illustrates these three pathways. The San Gorgonio Pass connects the Los Angeles Basin to the Colorado (Low) Desert. The wind through the pass is a constant current of air sweeping from the west to east. Based on tracer trajectory studies, the northwest part of the SCAB feeds into the Soledad Canyon while the southern part of the SCAB feeds into the Cajon Pass. Several Air Resources Board studies have also shown that transport occurs from the San Joaquin Valley to the SEDAB and that pollutant transport occurs from Mexico into the SEDAB.

Figure 1-3

Interbasin Transport Between South Coast and Southeast Desert Air Basins

(Soledad Canyon 3,300 ft; Cajon Pass 4,200 ft; San Gorgonio Pass 2,300 ft)



SCAQMD, AQMP for the Coachella Valley - San Jacinto Planning Area, Sept. 1994, Appendix I-B.

1.2.5 Regulatory Setting

There are three basic levels of government that have adopted regulations that limit stationary source emissions. The Environmental Protection Agency is responsible for enforcing, on a national basis, the requirements of many of the country's environmental and hazardous waste laws. The EPA's activities, by way of the California air pollution control program, focus principally on reviewing California's submittal for the State Implementation Plan (SIP). The California Air Resources Board (ARB) is the state air pollution control agency. Among ARB's responsibilities are the adoption of the state's ambient air quality standards; development, adoption, implementation, and enforcement of the state's motor vehicle pollution control program; review of the operations of local air pollution control districts and review and coordination of the preparation of the SIP for achievement of the federal ambient air quality standards. Under state law, local county, regional and unified air pollution control districts have primary authority over nonvehicular sources as well as transportation and other regional planning activities. Each level of government has adopted specific regulations that limit stationary source emissions and many of these regulations may be applicable to the Eagle Mountain Landfill and Recycling Center.

One of the primary federal regulations applicable to the Proposed Project is the Prevention of Significant Deterioration Program (PSD). This program allows new sources to be constructed or existing sources to be modified while preserving the existing ambient air quality levels, protecting public health and welfare, and protecting Class I areas (e.g., national parks and wilderness areas). The PSD requirements apply on a pollutant-specific basis to any project which is a new major stationary source or major modification to an existing stationary source. This determination is made based on evaluating the emissions changes associated with the Proposed Project in addition to all other emissions changes at the same location over the last five years. The principal requirements are that emissions must be controlled using the Best Available Control Technology (BACT); air quality impacts in combination with other increment consuming sources must not exceed maximum allowable incremental increases for NOx, SO_2, PM_{10}, and CO; air quality impacts of all sources in the area plus ambient pollutant background levels cannot exceed the National Ambient Air Quality Standards; pre-and/or post-monitoring may be required; and the air quality impacts on soils, vegetation, and nearby PSD Class I areas must be evaluated. The Proposed Project is within a Class II area, and is approximately 1.5 miles from the Joshua Tree National Park, a designated Class I area. At this point in time, the EPA administers this program.

The EPA also requires a comprehensive operating permit program for major stationary sources. Under this program, a single permit that includes a listing of all the stationary sources, applicable regulations, and requirements is required. The South Coast Air Quality Management District (SCAQMD) is the local district responsible for regulation of sources in the Proposed Project area and is expected to receive EPA approval for

enforcement of the federal operating permit program. The SCAQMD has also requested approval for administering another federal program under Title III of the federal Clean Air Act referred to as the Hazardous Air Pollutants program. This Title requires regulation of hazardous air pollutants from area source and industrial categories rather than concentrating on individual pollutants. Two other federal programs, the New Source Performance Standards and the National Emissions Standards for Hazardous Air Pollutants, have been delegated to the SCAQMD.

Among the major regulatory requirements of the SCAQMD is the New Source Review (NSR) requirements for pre-construction review. This regulation requires all new or modified sources of air pollution to apply BACT, requires emissions offsets for sources with emissions above 4 tons per year of Volatile Organic Compounds (VOC), NOx, SO_2 and PM_{10}. For sources of carbon monoxide, offsets are required above 29 tons per year. Furthermore, an air quality impact analysis of NOx, CO and PM_{10} is required for sources above specified threshold levels. In addition to these requirements, the SCAQMD has specific prohibitory emission levels for specific operations and pollutants. The more significant requirements include the limitation of particulate matter from a source, the limitation of the sulfur content of gaseous fuels used in stationary equipment, the specification and application method used during spray coating, the use of an approved landfill gas collection system and the control of gaseous emissions from active landfills.

1.3. Significance Criteria

To evaluate the air quality impacts associated with the project alternatives, various tools used by local, state and federal air quality agencies to determine whether a project's air quality impacts are significant have been identified. The measures of significance are those used for the evaluation of industrial sources of pollution. These measures include the threshold levels that are used for determining the requirements for issuing permits to construct or operate, the limits of detection or reportability of ambient concentrations, and levels that trigger measures in areas with severe air quality problems. The measures of significance vary depending on the pollutant, the existing air quality classifications in and near the project area and the emissions from the Proposed Project and other planned or existing projects in the vicinity of the Proposed Project. A sample of the measures of significance are shown in Table 1-5.

1.4. Project Emissions and Impacts

Emissions from the Proposed Project will be associated with a number of activities. These include both stationary sources, such as landfill gas flares, and mobile equipment, such as trains hauling waste. Mobile equipment includes train locomotives, on-highway haul trucks, and off-highway equipment. Emissions are also generated by

Table 1-5
Selected Measures of Significance

Agency	Level	Pollutant	Comment
SCAQMD	25 tons/year 25 tons/year 70 tons/year 100 tons/year 100 tons/year	NOx VOC PM_{10} CO SO_2	Definition of a major source
SCAQMD	0 lbs/day	All	Level above which BACT is required
SCAQMD	4 tons/year 29 tons/year	All Except CO CO	Level above which offsets are required
EPA	4 $\mu g/m^3$ Annual 8 $\mu g/m^3$ 24-hr	PM_{10}	EPA Class I PSD Increment
EPA	17 $\mu g/m^3$ Annual 30 $\mu g/m^3$ 24-hr	PM_{10}	EPA Class II PSD Increment
ARB	0.19 pphm (1-hr)	NOx	ARB measured accuracy of 0.76 percent times 25 pphm standard
ARB	1 pphm (1-hr)	NOx	Precision to which ARB reports concentrations

short-term construction activities, landfill road use, mine tailing reclamation, and solid waste transfer.

1.4.1 Construction Emissions

Emissions during the initial construction of the Proposed Project are generated by five main construction projects. These five projects are 1) improvement/extension of the existing Eagle Mountain Road; 2) construction of the Phase I intermodal rail/truck marshaling yard, including refurbishing existing warehouse and shop facilities; 3) reconstruction of the existing Eagle Mountain rail line; 4) preparation of the first phase of the landfill; and 5) the Townsite improvements.

The initial construction period will take approximately nine months. Each year, additional liner systems will be constructed, which will require a time period of about two to three months. The maximum emissions will occur when all five of the initial construction projects are active simultaneously. Total construction emissions are shown in Table 1-6.

Table 1-6 Total Construction Emissions (lbs/day)					
Operations	NOx	CO	PM_{10}	VOC	SO_2
Construction Equipment Combustion Emissions (excluding equipment directly associated with landfill area and Townsite)	1,142	322	58	107	37
Construction Equipment Combustion Emissions (equipment directly associated with landfill area)	460	156	20	31	19
Fugitive Dust (excluding operations directly associated with landfill area and Townsite)			1,368		
Fugitive Dust (operations directly associated with landfill area)			86		
Construction Equipment Combustion Emissions and Fugitive Dust (equipment directly associated with Townsite Improvements)	1,913	416	136	130	0
Total	3,473	894	1,668	268	80

1.4.2 Operation Emissions

Solid waste will be transported to Eagle Mountain by two modes: trains and trucks. Approximately 90 percent of the waste will be transported by train, primarily from the Los Angeles area, although waste will also be transported by train from parts of Ventura, Santa Barbara, and San Diego Counties. The remainder of waste will be hauled from areas within Riverside County by truck. Both transportation modes will produce exhaust emissions from the combustion of Diesel fuel.

Based on a maximum expected daily waste haul rate of 18,000 tons, the Proposed Project includes 5 to 6 train round-trip deliveries per day depending on the amount of waste hauled per train. An estimated 2,000 tons per day of waste will be transported to the Project Site by on-highway haul trucks. This will result in up to 100 truck round-trips to the Project Site per day with 20 ton loads.

On-site material handling emissions will be generated from heavy equipment, the fleet of hostling vehicles which will haul containers from the intermodal rail/truck marshaling yards to the landfill face, the other general activities associated with the operation of the landfill such as overhead cranes, crawler tractors spreading the dumped waste to shape the fill, and compactors that roll over the graded surface to develop the desired volume reduction of deposited material. Although liner construction activities are associated with the initial construction of the Proposed Project, liner construction

will occur periodically during the development of the landfill. Therefore, emissions from this activity are also included in the emissions associated with the day-to-day operation of the facility. Other activities that will generate emissions include exhaust emissions from loaders, dump trucks, and bulldozers, compactors used at the final cover construction area and working face of the landfill to spread and compact the cover material, vehicles used on-site to maintain roadways used to transport liner, waste and cover material, water trucks used to water-flush paved roads and unpaved roadway surfaces during landfill operations to mitigate fugitive dust emissions and enhance compaction of surface material. Finally, the Project will also include support operations such as a maintenance paint shop, locomotive sand silo, emergency generators, and fuel storage and dispensing operations.

Landfill gas will be formed over time as waste decomposes. In the absence of oxygen, hydrocarbon wastes will break down to form predominantly carbon dioxide and methane. Trace quantities of toxic gases will also be formed by these processes. Stringent design and monitoring requirements of the SCAQMD municipal solid waste landfill regulations require that the landfill gas collection system capture at least 90 percent of the gas generated. Captured landfill gas will be piped to a combustion system for incineration. To account for the worst-case combustion emissions, it was assumed that 100 percent of the landfill gas generated is piped to the combustion system and that 10 percent of the gas escapes into the atmosphere. The gas combustion system will initially use flares to burn the methane and other gases. As the gas generation rate of landfill gases increases with the increasing age of deposited waste, alternative energy recovery systems such as a gas turbine power plant or landfill gas processing plant may be substituted for the flares.

The total project emissions are shown in Table 1-7. Also shown in Table 1-7 are emissions generated from activity associated with workers commuting to and from the Project Site and commercial development at the Eagle Mountain Townsite. Overall, the emissions shown in Table 1-8 take into account the emission controls that the Project must incorporate in order to comply with the SCAQMD and the EPA emission standards.

1.4.3 Project Impacts

An analysis was performed of the impacts of the Project on ambient concentrations of pollutants. This analysis was performed for the area surrounding the landfill site. A separate analysis of the ambient impacts on the Joshua Tree National Park was also performed. In addition, an analysis of ambient air quality impacts was performed for a typical rail crossing impacted by the Project. Table 1-8 presents the results of the air quality modeling analysis.

Table 1-7
Total Project Emissions
Proposed Project Without Mitigation

Activity	(lbs/day) NOx	CO	PM10	VOC	SO2	(tons/yr) NOx	CO	PM10	VOC	SO2
Offsite Sources										
Trains	11,761	1,673	264	527	889	2,146	305	48	96	162
On-Highway Trucks	940	451	127	94	26	172	82	23	17	5
Subtotal, Offsite	12,701	2,124	391	621	915	2,318	387	71	113	167
Onsite Sources										
Trains	220	90	7	39	24	40	16	1	7	4
On-Highway Trucks	48	7	3	6	1	9	1	1	1	0
Townsite	98	1,022	8	83	8	18	187	2	15	1
Onsite Vehicle Exhaust	3,020	521	173	156	95	551	95	32	29	17
Onsite Fugitive Dust			560					102		
Landfill Gas Flares	1,264	903	803	368	468	231	165	147	67	85
Fugitive Landfill Gas				311					57	
Maintenance Shop			1	12				0	2	
Emergency Generators	4	29	0	0	0	0	1	0	0	0
Fuel Storage Tanks				2					0	
Leachate/Condensate Tanks				0					0	
Locomotive Sand Silo			0					0		
Subtotal, Onsite	4,654	2,573	1,554	978	595	849	465	284	178	109
PROJECT TOTAL	17,355	4,697	1,945	1,599	1,510	3,167	852	355	292	276

Table 1-8
Eagle Mountain Landfill and Recycling Center
Proposed Project Without Mitigation
Ambient Air Quality Impacts

Pollutant/ Averaging Time	California Standards	National Standards	EPA Class II Increments ($\mu g/m^3$)	Modeled Ambient Impact ($\mu g/m^3$)	Ambient Background Levels[1] ($\mu g/m^3$)	Combined Levels ($\mu g/m^3$)
NO_2						
1-hour	470	-	-	323	75	398
Annual	-	100	25	22	6	28
SO_2						
1-hour	655	-	-	38	213	251
3-hour	-	1300	512	36	-	-
24-hour	105	365	91	12	34	46
Annual	-	80	20	2	11	13
CO						
1-hour	23,000	40,000	-	1,761	10,354	12,115
8-hour	10,000	10,000	-	655	4,304	4,959
PM_{10}						
24-hour	50	150	30	38[2]	210	248
Annual	30	50	17	6	22	28

Footnote:

1 For NO_2, CO, and PM_{10}, maximum levels monitored at the Project Site. Because ambient SO_2 levels were not measured at the Project Site, background SO_2 levels are the maximum monitored within the SEDAB.

2 The maximum allowable Class II PM_{10} increment may be exceeded during one 24-hour period at any one location. For the mitigated project, the Class II increment was not exceeded more than once at any location.

The analysis was performed with a high degree of conservatism. Consequently, actual Project impacts would be expected to be significantly lower than those shown. The data indicate that the Project's unmitigated impacts, which are below the ambient air quality standards (AAQS), would represent the following fractions of the most stringent AAQS for each pollutant:

Carbon Monoxide	8%
Nitrogen Dioxide	69%
Sulfur Dioxide	11%
Fine Particulates (PM_{10})	76%

The data indicate that, in the absence of mitigation measures, the Proposed Project is not expected to result in a violation of the state or national standards for NO_2, SO_2 and CO, even in combination with background ambient levels measured at the Project Site. For PM_{10}, Project impacts alone are not expected to exceed the state or national standards. However, the state and national 24-hour average PM_{10} standards are exceeded in the absence of the Project. The Project's impacts exacerbate violations of the PM_{10} standard. The data from the analysis for the rail crossing shown only a minor impact for carbon monoxide during train crossings. The NOx impacts show that there could be a short-term concentration of 129 $\mu g/m^3$ (27% of the 1-hour standard) which could be reached near the intersection, assuming worst-case weather conditions.

1.4.4 Impacts at Joshua Tree National Park

Table 1-9 shows the impacts of the Proposed Project on the Joshua Tree National Park.

1.4.4.1 Regional Haze

The Proposed Project's impact on regional haze is characterized by a deciview (dv) scale similar to the decibel index for sound. A one dv change is considered to be the threshold for regulatory concern about haze impacts. A one dv change represents about a 10% change in extinction coefficient, which is a small, but perceptible scenic change. The maximum calculated change is 0.40 dv at 50 km using winter assumptions. The results show that the maximum regional haze impact for the Proposed Project is well below the threshold of 1.0 dv.

1.4.4.2. Acid Deposition

Because acid deposition contains a variety of chemical components and is deposited in multiple forms (e.g., rain, snow, fog, and as dry particles), it is difficult to determine an acceptable level or standard. Minnesota is the only state that has set an acidic deposition standard to protect sensitive aquatic and terrestrial ecosystems. The standard limits the amount of wet-deposited sulfate (SO_4^{2-}) deposition to an annual total of 11 kg/hectare, which would allow only tolerable amounts of acidity to be deposited in the most sensitive lakes in the state. The maximum annual SO_2 deposition rates for the Proposed Project are 0.45 kg/hectare for the project without mitigation and 0.41 kg/hectare for the project with mitigation (0.68 and 0.62 kg/hectare sulfate, respectively, when adjusted for molecular weight). This level is significantly lower than the level set by the state of Minnesota. Because the actual project impacts would be expected to be significantly lower than those calculated, the acid deposition impact from SO_2 is not considered to be significant.

Table 1-9
Eagle Mountain Landfill and Recycling Center
Project Impacts on Joshua Tree National Park

Analysis	Significance Criteria[1]	Worst-Case Project Impacts		
		Unmitigated Project	Mitigated Project	Mitigated Reduced Vol. Alternative
Regional Haze @ 50 km	1.0 dv	0.40	0.40	N/A[2]
Acid Deposition	11.0 kg/ha/yr Sulfate 15.0 kg/ha/yr Nitrate	0.68 15.5	0.62 8.2	N/A[2] N/A[2]
Prevention of Significant Deterioration-Class I area	8 $\mu g/m^3$ (24-hr) PM_{10} 4 $\mu g/m^3$ (Ann) PM_{10} 25 $\mu g/m^3$(3-hr) SO_2 5 $\mu g/m^3$ (24-hr) SO_2 2 $\mu g/m^3$ (Ann) SO_2 2.5 $\mu g/m^3$ (Ann) NO_2	9 1 9 3 0 2	8 1 9 3 0 1	6 1 7 2 0 1
Visibility	Max Delta-E[3] (2.0-4.0)	Max=6.7 0.34% of yr>4.0 1.02% of yr>2.0	Max=3.9 0.00% of yr>4.0 0.45% of yr>2.0	Max=3.2 0.00% of yr>4.0 0.33% of yr>2.0
Contrast	Max Contrast (0.05-0.10)[3]	Max=0.158 0.14% of yr>0.10 0.66% of yr<0.05	Max=0.100 0.00% of yr>0.10 0.33% of yr>0.05	Max=0.082 0.00% of yr>0.10 0.14% of yr>0.05
Vegetation	NOx SO_2	not significant not significant	not significant not significant	N/A[2] N/A[2]

[1] Definition of Criteria:
Regional Haze (dv) - Deciviews, a visual index to characterize visibility through uniform hazes
Acid Deposition (kg/ha/yr)-Annual amount of pollutant (weight in kg) deposited in area (hectare=2.471 acres)
Prevention of Significant Deterioration ($\mu g/m^3$)-Measure of ambient air quality (concentration in atmosphere)
Visibility (Delta-E)-Indicator of plume perceptibility and atmospheric discoloration.

[2] N/A-Impacts from the mitigated reduced volume alternative would be below those shown for the mitigated project.

[3] % of yr-Represents the amount of time that Delta-E or contrast exceeds specified level for worst-impacted observer.

To determine significance criteria for nitric acid deposition, estimates for a critical load in the of range 5 - 45 kg N/hectare/year were used with a value of 15 kg N/hectare/year being typical. The maximum loads calculated for JTNP are 70.5 kg HNO3/hectare/year for the Proposed Project, or 37.2 kg HNO3/hectare/year for the Mitigated Project (15.5 and 8.2 kg N/hectare/year, respectively, when corrected for molecular weight). As pointed out in the attached Air Quality Appendix, however,

the concatenation of several very conservative assumptions in the Level-1 analysis leads to a gross over-estimate of the amount of deposition, perhaps by as much as an order of magnitude or more. If the Level-1 deposition results are reduced by an order of magnitude in order to correct for the conservatism in Level-1 assumptions, Project impacts (1.6 and 0.8 kg N/hectare/year, respectively, for the Project without and with mitigation) are significantly lower than critical nitrogen loads established for a variety of sensitive, but generally much wetter, watersheds elsewhere in the world.

1.4.4.3 Vegetation

Ozone probably causes more plant damage in the U.S. than any other pollutant. In three of the SCAB's forest areas, San Bernardino, Angeles and the Santa Monica Mountains, actual damage to vegetation has been attributed to ozone and combinations of ozone and sulfur dioxide. Ozone exceedances in the SCAB are a regional problem and are considered the primary cause of the ozone accedences downwind or in eastern parts of the SCAB and the Southeast Desert Air Basin due to transport. Ozone increases caused by the Project itself are not considered to be significant and will not contribute significantly to this regional transport problem.

According to an Air Resources Board report,* there are only a few studies that provide information on one-hour exposures to ambient NO_2 at 0.25 ppm. A decline in plant productivity can be detected for exposure for a day or longer to NO_2 in the range of 0.02 to 0.1 ppm for the most sensitive species. It does not appear that the species found in the Project area or in the JTNP are the most sensitive to this pollutant. In addition, emissions from the Proposed Project will result in ambient NOx levels far below the threshold level for damage identified by Wark and Warner (2.5 ppm or 4700 $\mu g/m^3$ for a four-hour exposure). Therefore, no detrimental effects from NO_2 are expected.

Sulfur dioxide pollution is also a potential concern in the area, as SO_2 may damage the leaves of some plants exposed to sufficiently high concentrations and dosage. A threshold does exist because plants exposed to only low concentrations are able to take in small amounts of SO_2 through the stomata and dispose of it without damage. Concentrations above the threshold for a particular plant cause deterioration of the internal cells and leaf discoloration. Studies conducted also found that the "main detriment of growth effects was average, not peak SO_2 concentrations." Wark and Werner suggest a threshold value of 0.3 ppm (785 $\mu g/m^3$) sustained exposure for eight hours, and indicate that concentrations of 0.3 to 0.5 ppm for several days can lead to chronic injury to sensitive plants. Concentrations in the Southeast Desert Air Basin are significantly below the thresholds identified for desert species. The emissions of SO_2

*California Air Resources Board, Research Division, The Atmospheric Acidity Protection Program: Annual Report to the Governor and the Legislature, 1991.

from the Proposed Project will not add significantly to these concentrations and therefore no adverse impacts will result from the Proposed Project.

1.4.4.4. Visibility

Regional visibility is affected by emissions of hydrocarbons, oxides of nitrogen, sulfur dioxide and particulate matter. A detailed analysis of the Proposed Project's impacts on regional visibility is included in Attachment E. The measurement of visibility used is Delta-E and a contrast value. The EPA suggests the range of Delta-E between 1 and 4 (Delta-E of 2.0 roughly corresponds to a contrast value of 0.05) as the approximate threshold of plume perceptibility.

The results of the modeling analysis for the Proposed Project without mitigation shows that the maximum number of observations above a Delta-E of 4.0 was 30 and above a contrast of 0.10 was 12 for the worst impacted observer. These values represent a maximum of potential observable conditions for only 0.34 percent and 0.14 percent for Delta-E and contrast, respectively, of the total hours per year. The maximum number of observations with a Delta-E over 2.0 was 89 for the worst impacted observer. This represents a maximum potential observable condition for only 1 percent of the total hours per year. The maximum number of observations with a contrast value greater than 0.05 was 58 for the worst impacted observer. This represents less than 1 percent of the total hours per year.

The results of the modeling analysis for the Proposed Project with mitigation show that there were no observations above a Delta-E of 4.0 or contrast value of 0.10. For the mitigated project, the maximum number of observations with a Delta-E over 2.0 was 39 for the worst impacted observer. This represents a maximum of potential observable conditions for only 0.45 percent of the total hours per year. The maximum number of observations with a contrast value greater than 0.05 was 29 for the worst impacted observer. This represents only 0.33 percent of the total hours per year.

The proposed project, including the gas flares, would not create a noticeable change or impact in regional visibility or haze to the casual observer from locations at the closest boundaries of JTNP to the Project Site. This is based upon the results of the visibility modeling which indicate no readings above the threshold of ΔE of 4.0 or contrast value of 0.10 for the mitigated project. The proposed project at full operation with mitigation would create a slight discoloration in regional visibility for the most sensitive observer less than 0.5% of the time within four miles of the Project Site. This impact is considered insignificant because: 1) the sensitive observer would need to be in an area of the Park where there are no existing trails or campsites; 2) the observer would have to be at this location for some part of the 39 hours per year (0.45%) that this condition might occur; and 3) the background visual range would have to be at the ten percentile value or better during these 39 hours.

1.4.4.5 Prevention of Significant Deterioration

Although the Proposed Project would not trigger PSD review, an evaluation of the impacts show that the Proposed Project with mitigation would not exceed the Class I area increments for any pollutant.

1.4.5 Consistency with Regulatory Programs

The determination as to whether the Proposed Project will be subject to Prevention of Significant Deterioration (PSD) review is based on its emissions. Based on review of the emissions and a comparison of these emissions to the PSD trigger levels, it was determined that the Project will not trigger PSD review. The federal New Source Performance Standard for Non-Metallic Mineral Processing Plants would limit the particulate matter emissions to the on-site material processing plants. These processing plants will meet the requirements of this regulation with the use of water sprays and dust collectors. The federal standard for Municipal Solid Waste Landfills would require the installation of a gas collection system and a system for disposing of the collected gas. The Proposed Project will meet these requirements by installation of a gas collection system and will dispose of the collected gas with flares and/or an energy recovery system. The only other federal requirement that must be met is that the Project must obtain a Title V operation permit. Since the only purpose of the Title V regulation is to combine all applicable requirements from other air quality regulatory programs into a single permit, there are no additional emission limits or control technology requirements imposed by this program.

With regard to local regulatory requirements, the Proposed Project will be subject to regulations of the SCAQMD. These regulations limit emissions of various pollutants from many sources, including landfill flares and other gas combustion devices. Included in these regulations are rules for fugitive dust (Rule 403) and particulate matter (Rule 404). These rules will apply to fugitive emissions from haul roads, excavation areas, and waste disposal areas and the concentration of particulate matter from fuel burning equipment (Rule 474). These regulations will apply to the landfill gas flares and emergency generators.

The Project will also be subject to the SCAQMD New Source Review rule (Regulation XIII). This rule will require a preconstruction permit for the landfill gas collection and disposal system, fuel storage and dispensing operations, maintenance paint shop, material processing plants, locomotive sand silo, and emergency generators. Each of these operations will require application of the Best Available Control Technology (BACT). Two general levels of control that would apply to the Project are 1) the use of control methods that are technologically feasible, barring a demonstration that the methods are not cost-effective, or 2) the use of control methods that have been achieved in practice or are contained in an EPA-approved State Implementation Plan, regardless of cost. An evaluation was made of the available technology and it was determined

that the Project will meet these requirements. Among the technology that will be employed is the control of NOx from the flares to a level of 0.06 pounds of NOx per million Btu, the use of low volatile organic compound coatings for paint spray booths and the use of vapor control systems for the Diesel storage tanks.

The Project will also comply with the requirements of Rule 1401 (Toxics) which will require that a health risk assessment be performed for permit units required to undergo new source review under Regulation XIII. During the initial SCAQMD permit review process for the first two landfill gas flares during 1994, a screening level risk assessment was performed and approved which indicated that the two flares would not exceed the Rule 1401 significance levels.

1.4.6 Mitigation Measures

Mitigation measures include regulatory actions by other agencies which are reasonably foreseeable, or which have future effective dates, as well as measures which can be implemented by the applicant. Mitigation measures recommended for the project are shown in Table 1-10. Mitigation measures are organized in Table 1-10 into two groups (i.e., existing requirements and additional measures). The existing requirements includes project mitigation required by existing regulatory measures. Emission estimates for the Proposed Project with and without mitigation reflect the reductions associated with these measures. The additional measures are control techniques proposed for the project that go beyond those measures required by existing regulations.

Diesel engine exhaust emissions from railway locomotives will contribute to the cumulative environmental impact of the Project. The emissions from the Proposed Project have been computed using factors for current generation locomotives. Future locomotives will have lower emissions, but the exact level of these emissions is not certain until ongoing regulatory action is completed. Among the control technologies that have the potential to reduce locomotive emissions, but are not practicable or cost from landfill gas flares, emergency generators, maintenance paint shop, and the dust collector exhausts associated with material process plants and locomotive sand silo. There are also rules limiting the sulfur content of gaseous fuels (Rule 431.1) and NOx effective for routine operations, are a reduction in idling emissions by shutting down locomotives whenever they will not be needed for at least one hour, use of low-sulfur, low aromatic Diesel fuel, Diesel engine controls such as retarded injection timing, use of electronic fuel injection to improve engine control for lower emissions, and electrification of railway operations.

Exhaust emissions from Diesel engines used in landfill and waste-handling equipment at the Project Site will also contribute to the cumulative environmental impact of the Project. Conceivable measures that could be taken include operational measures such as limiting the time spent with the engine idling by shutting down equipment when not

Table 1-10
Mitigation Measures Recommended for Project Approval

Operation	Measure
Measures to meet existing requirements	
Trucks Hauling Waste	Comply with all applicable CA motor vehicle regulations
Diesel Fuel Quality	Trucks use Diesel fuel that meets CA on-road regulations
Smoke Enforcement	Trucks periodically checked for excessive smoke
Truck Inspection	Periodic checks by Highway Patrol for excessive smoke and tampering
Landfill Diesels	All Diesel-fueled equipment comply with CA on-road regulations
Construction Equipment	Purchase landfill equipment that meets state and federal emission controls
Flare Emissions	Conduct feasibility study of recovering energy from landfill gas
Temporary Roads	Apply water and chemical dust suppressants
Transitional Haul Roads	Apply chemical dust suppressants on base of compacted crushed rock
Permanent Non-Haul Roads	Pave all on-site roads and periodically clean with sweepers or water flush
Excavation	Pre-water tailing and overburden piles prior to excavation
Misc Fugitive Dust	Apply water as a dust suppressant prior to clearing material or other activity
Wind Erosion	Compact and apply chemical dust suppressant to or cover construction areas
Offsite Paved Roads	Trucks to pass through on-site wheel-washing station/maintain 2 ft freeboard
Material Processing	Equip processing plants with water sprays and/or vent to dust collectors
Additional measures	
Locomotive Operations	Shut down engines when not needed for one hour or more
Railway Locomotives	Locomotives use Diesel fuel that meets CA on-road regulations
Locomotive Diesels	New Diesel locomotive engines to comply with all state and federal regulations
Locomotive Diesels	remanufacture all existing engines to comply with future EPA regulations
Locomotive Diesels	Study feasibility of Alternative Fuels
Railway Electrification	Study cost/effectiveness of electrifying the Eagle Mountain Railway
Landfill Equipment	Shut down equipment if idle for fifteen minutes or longer
Landfill Diesels	Evaluate feasibility of purchasing engines that meet CA and EPA standards
Landfill Diesels	Purchase low-NOx engines for equipment that is not suitable for on-road use
Landfill Equipment	Purchase and operate electric versions of landfill equipment when feasible
Air Quality Monitoring	Install and operate fine particulate and gaseous pollutant monitoring system

in use, regular preventive maintenance to prevent emission increases due to engine problems, the purchase and use of turbocharged and intercooled Diesel engines, when available, with retarded injection timing and the use of low-emitting Diesel engines meeting California emission standards for highway trucks.

If the landfill gas generation rates reach levels where an energy recovery facility becomes feasible, the Proposed Project may replace or supplement the flare system with a gas turbine power plant, gas treatment compression facility, or gas treatment liquefication facility. If and when this occurs, the gas turbine would be equipped with BACT, which would include an SCR unit (or the equivalent) to control NOx emissions and an oxidation catalyst to control CO and ROG emissions. If a gas compression facility was selected, the landfill gas captured by the landfill gas collection system would be piped to the facility for cleaning and compression. The treated compressed landfill gas could be used on-site for alternative fuel-fired equipment, with surplus gas being piped to the local gas utility distribution system.

1.4.7 Project Impacts with Mitigation

The impacts on emissions and air quality from applying the mitigation measures discussed above are shown in Table 1-11. The data show that the mitigation measures have the greatest benefits in reducing emissions of NOx and SOx.

The resultant air quality impacts are shown on Table 1-12. These impacts show a reduction in NO_2 and SO_2 concentrations. As with the unmitigated impacts, the Project is expected to exacerbate existing violations of the 24-hour PM_{10} standard. As discussed previously, the air quality impact analysis reflects a high degree of conservatism.

1.4.8 Assessment of Significance

Based on the significance criteria discussed in Section 1.3, many of the emission and concentration based significance thresholds are exceeded by the Proposed Project for all the criteria pollutants. Based on these criteria, the Proposed Project would be expected to have a significant effect on air quality. However, several alternatives to the Proposed Project are discussed in the alternatives section of the air quality impacts analysis. As a result of some of these alternatives, the Proposed Project could result in lower emission levels in the SCAB for all pollutants at the expense of increased impacts in desert areas. The improvements in the SCAB would result in less impacts on air quality from the transport of improved air quality over the San Gorgonio Pass; however, these benefits would not be sufficient to outweigh the direct adverse impacts on the desert.

Table 1-11
Total Project Emissions
Proposed Project With Mitigation

Activity	(lbs/day) NOx	CO	PM10	VOC	SO2	(tons/yr) NOx	CO	PM10	VOC	SO2
Offsite Sources										
Trains	3,377	1,170	206	342	157	616	214	38	62	29
On-Highway Trucks	940	451	127	94	26	172	82	23	17	5
Subtotal, Offsite	4,317	1,621	333	436	183	788	296	61	79	34
Onsite Sources										
Trains	104	50	5	14	4	19	9	1	2	1
On-Highway Trucks	3	3	0	0	0	1	0	0	0	0
Townsite	98	1,022	8	83	8	18	187	2	15	1
Onsite Vehicle Exhaust	1,237	764	106	156	95	226	139	19	29	17
Onsite Fugitive Dust			560					102		
Landfill Gas Flares	1,264	903	803	368	468	231	165	147	67	85
Fugitive Landfill Gas				311					57	
Maintenance Shop			0	12				0	2	
Emergency Generators	4	29	0	0	0	0	1	0	0	0
Fuel Storage Tanks				2					0	
Leachate/Condensate Tanks				0					0	
Locomotive Sand Silo			0					0		
Subtotal, Onsite	2,710	2,771	1,483	948	575	494	501	271	173	105
PROJECT TOTAL	7,027	4,392	1,816	1,384	758	1,282	797	332	252	139

Table 1-12
Eagle Mountain Landfill and Recycling Center
Proposed Project With Mitigation
Ambient Air Quality Impacts

Pollutant/ Averaging Time	California Standards	National Standards	EPA Class II Increments ($\mu g/m^3$)	Modeled Ambient Impact ($\mu g/m^3$)	Ambient Background Levels[1] ($\mu g/m^3$)	Combined Levels ($\mu g/m^3$)
NO_2						
1-hour	470	-	-	266	75	341
Annual	-	100	25	14	6	20
SO_2						
1-hour	655	-	-	35	213	248
3-hour	-	1300	512	34	-	-
24-hour	105	365	91	11	34	45
Annual	-	80	20	1	11	12
CO						
1-hour	23,000	40,000	-	1,761	10,354	12,115
8-hour	10,000	10,000	-	655	4,304	4,959
PM_{10}						
24-hour	50	150	30	35[2]	210	245
Annual	30	50	17	5	22	27

Footnote:

1 For NO_2, CO, and PM_{10}, maximum levels monitored at the Project Site. Because ambient SO_2 levels were not measured at the Project Site, background SO_2 levels are the maximum monitored within the SEDAB.

2 The maximum allowable Class II PM_{10} increment may be exceeded during one 24-hour period at any one location. For the mitigated project, the Class II increment was not exceeded more than once at any location.

1.5 Alternatives

1.5.1 Reduced Volume Alternative

Under this alternative, 16,000 tons per day of waste would be transported to the landfill site. The amount of waste hauled by truck would be identical but the rail hauling for this alternative would be approximately 78% of the level assumed for the Proposed Project (i.e., 14,000 tons/day vs. 18,000 tons/day). Consequently, for this alternative, rail emissions would be approximately 22% lower than for the Proposed Project.

1.5.2 Rail Access Only Alternative

For the rail access only alternative, 18,000 tons per day of waste would be transported to the landfill by rail with no truck hauling included. Because the amount of waste

hauled by rail is identical to the level assumed for the Proposed Project, the emissions for rail hauling would be identical to the level assumed for the Proposed Project.

1.5.3 Alternative Road Alignment Alternative

Emissions and impacts for this alternative would be the same as the other alternatives with the exception that an alternative access road would require slightly longer haul distances for solid waste transported to the landfill by trucks. As a result, truck emissions for this alternative will be higher than levels shown for the Proposed Project.

1.5.4 Landfill On Kaiser Land Only Alternative

For this alternative, landfill would only occur on Kaiser-owned lands in and around the East Pit. Emissions would be the lower than the reduced volume alternative because at maximum operating levels, 10,000 tons of waste will be transported to the landfill, with 8,000 tons per day by rail and 2,000 tons per day hauled by truck.

1.5.5 No Townsite Alternative

This project is identical to the Proposed Project with the exception that the Eagle Mountain Townsite would not be developed. Under this alternative, it is assumed that the workers at the landfill site would commute to the site from local communities such as Desert Center, Blyth and Indio. Thus, emissions associated with this alternative would be the same as the Proposed Project, with the exception that additional emissions would be associated with travel to and from these communities.

1.5.6 No Project Alternative

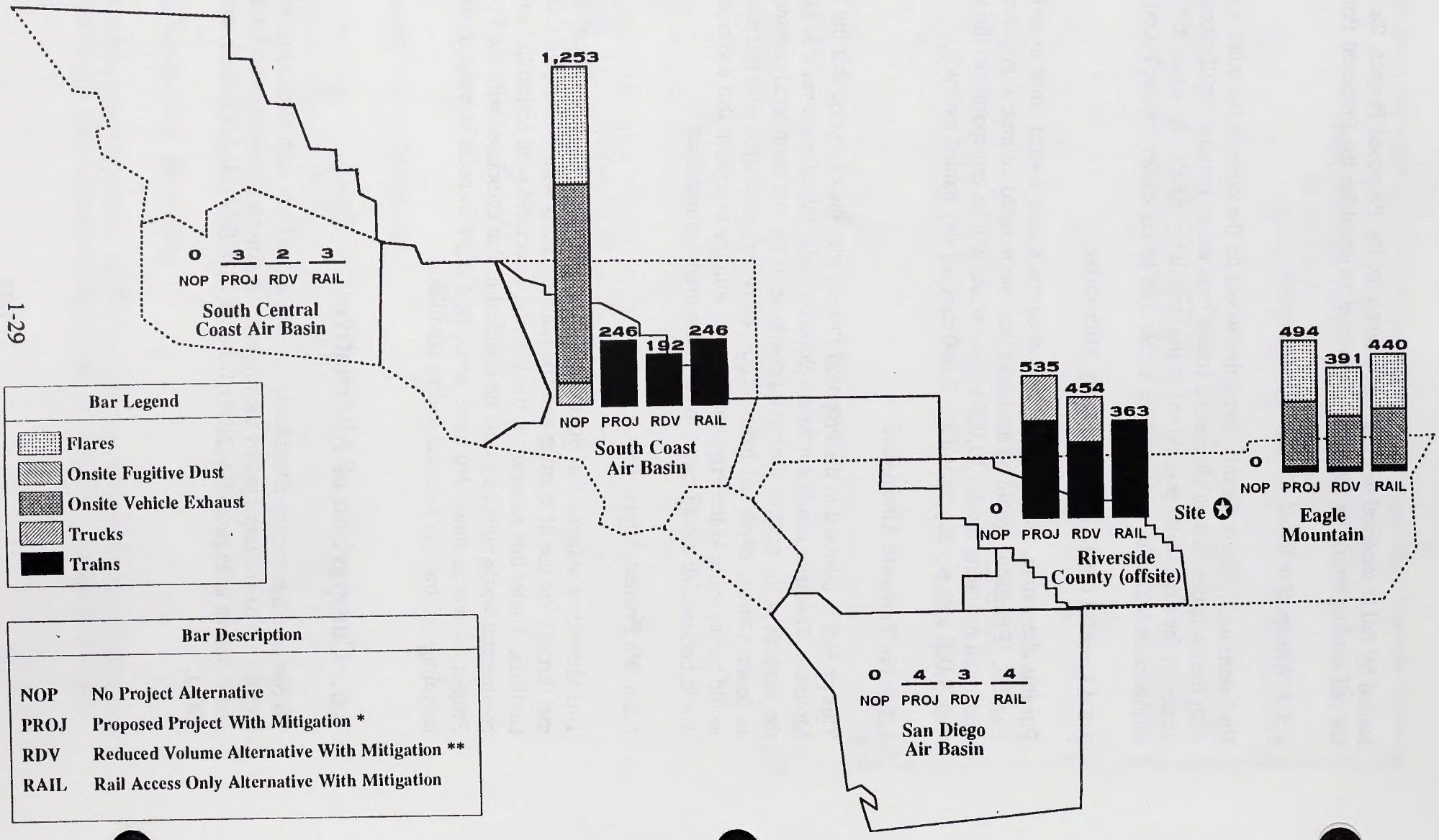
This alternative assumes that Southern California's landfill needs will continue to be met through the use of existing and additional capacity within Southern California landfills. Under this alternative, truck traffic associated with residential and commercial waste pickups would be identical to that associated with the Proposed Project. It was assumed that there would be a slight increase in truck traffic to recycling and transfer facilities and/or landfills.

1.6. Comparison of Alternatives

To compare the various alternatives, the emissions from each alternative were divided into the air basins impacted by the projects. A comparison was made for each pollutant and is shown in Figures 1-4 (NOx),1-5 (CO), 1-6 (PM_{10}), 1-7 (VOC), and 1-8 (7-5) (SO_2).

Figure 1-4

Regional NOx Emissions Impact
Eagle Mountain Landfill and Recycling Center
(Emissions in Tons/Year)

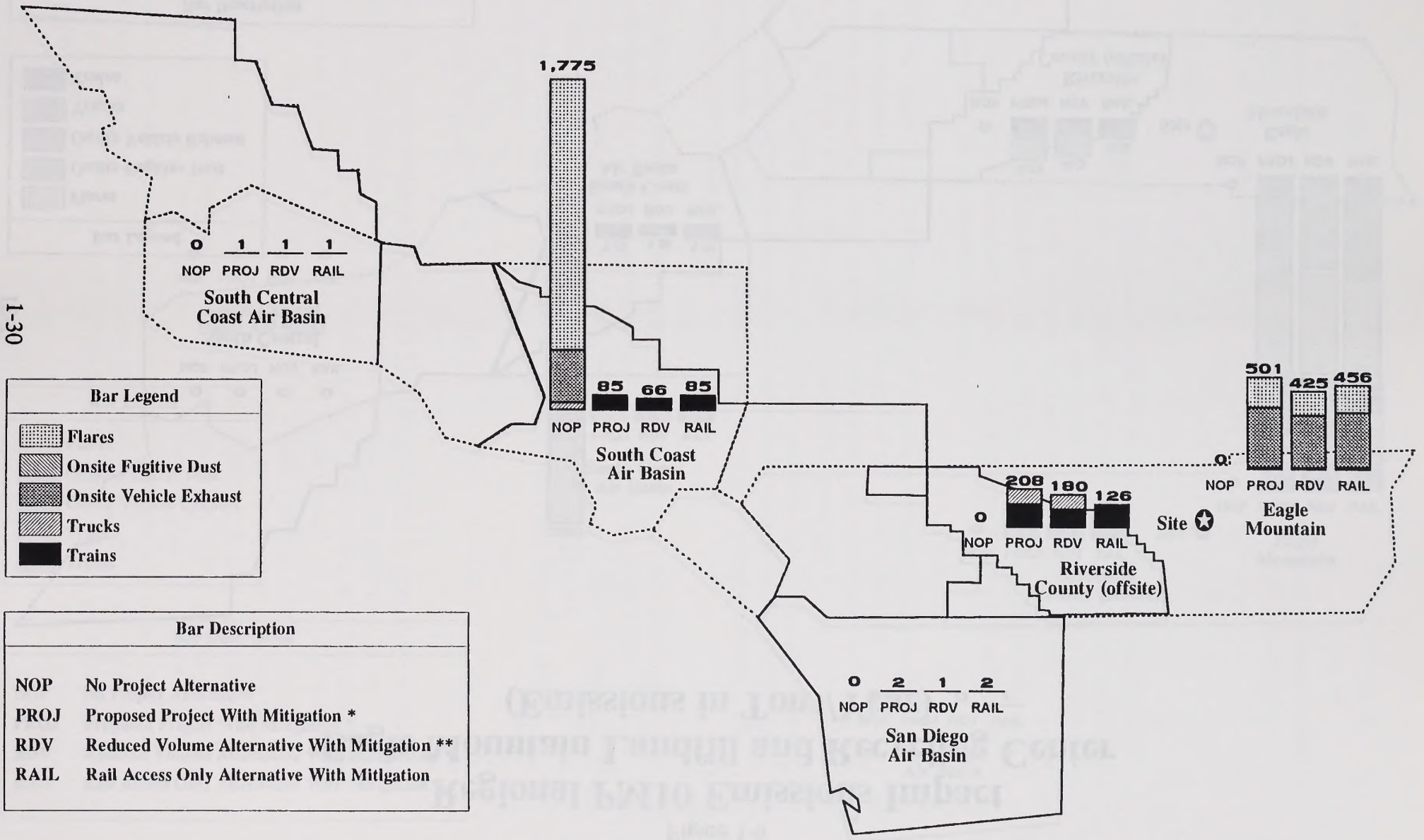


* No Town... Alternative will have impacts just below these levels while Alternative Roa... gnment Allternative will have impacts slightly above these levels.

** Landfill on Kaiser Land Only Alternative will have impacts below these levels.

Figure 1-5

Regional CO Emissions Impact
Eagle Mountain Landfill and Recycling Center
(Emissions in Tons/Year)

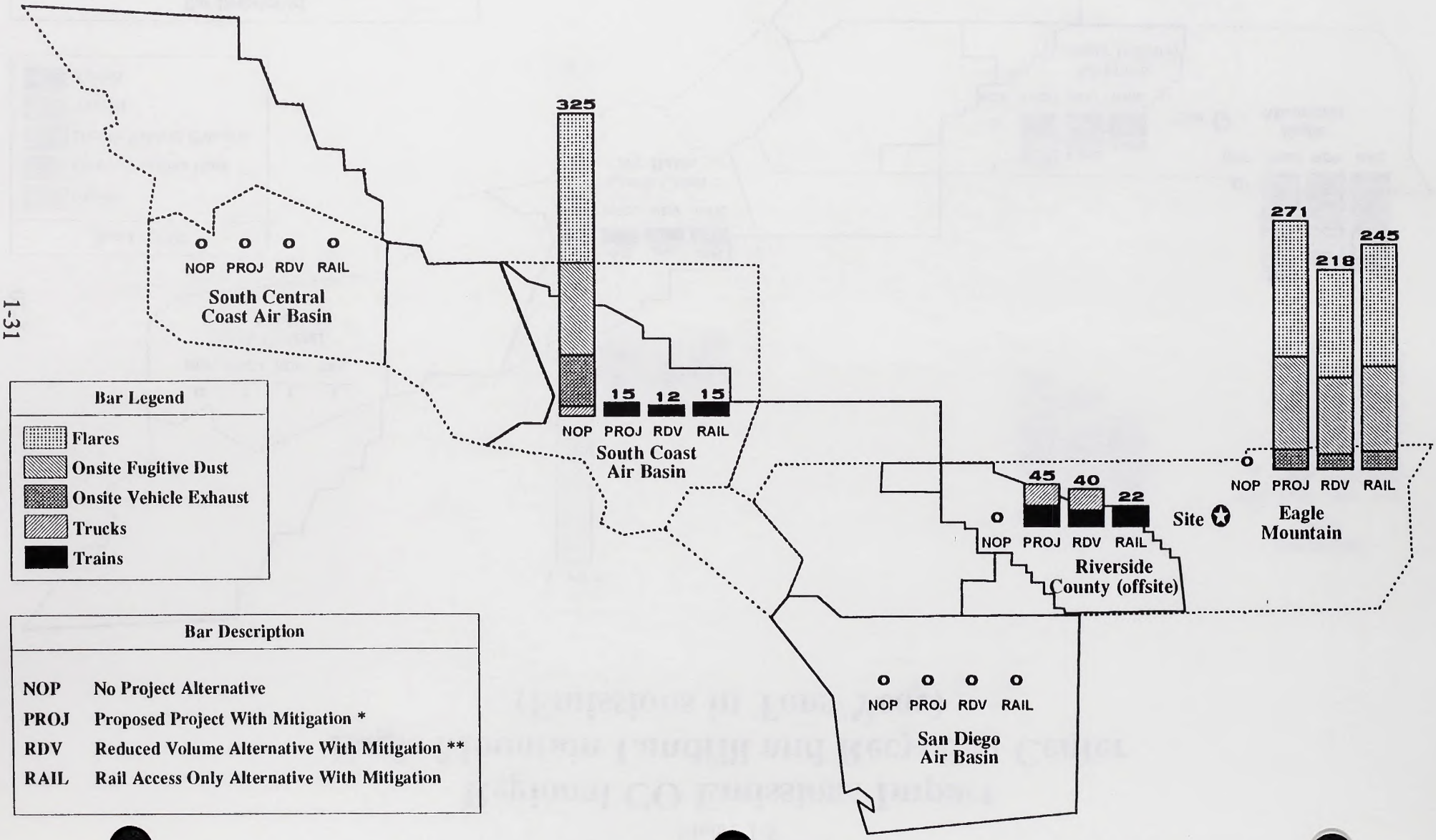


Bar Description	
NOP	No Project Alternative
PROJ	Proposed Project With Mitigation *
RDV	Reduced Volume Alternative With Mitigation **
RAIL	Rail Access Only Alternative With Mitlgation

* No Townsite Alternative will have impacts just below these levels while Alternative Road Alignment Allternative will have impacts slightly above these levels.
** Landfill on Kaiser Land Only Alternative will have impacts below these levels.

Figure 1-6

Regional PM10 Emissions Impact
Eagle Mountain Landfill and Recycling Center
(Emissions in Tons/Year)

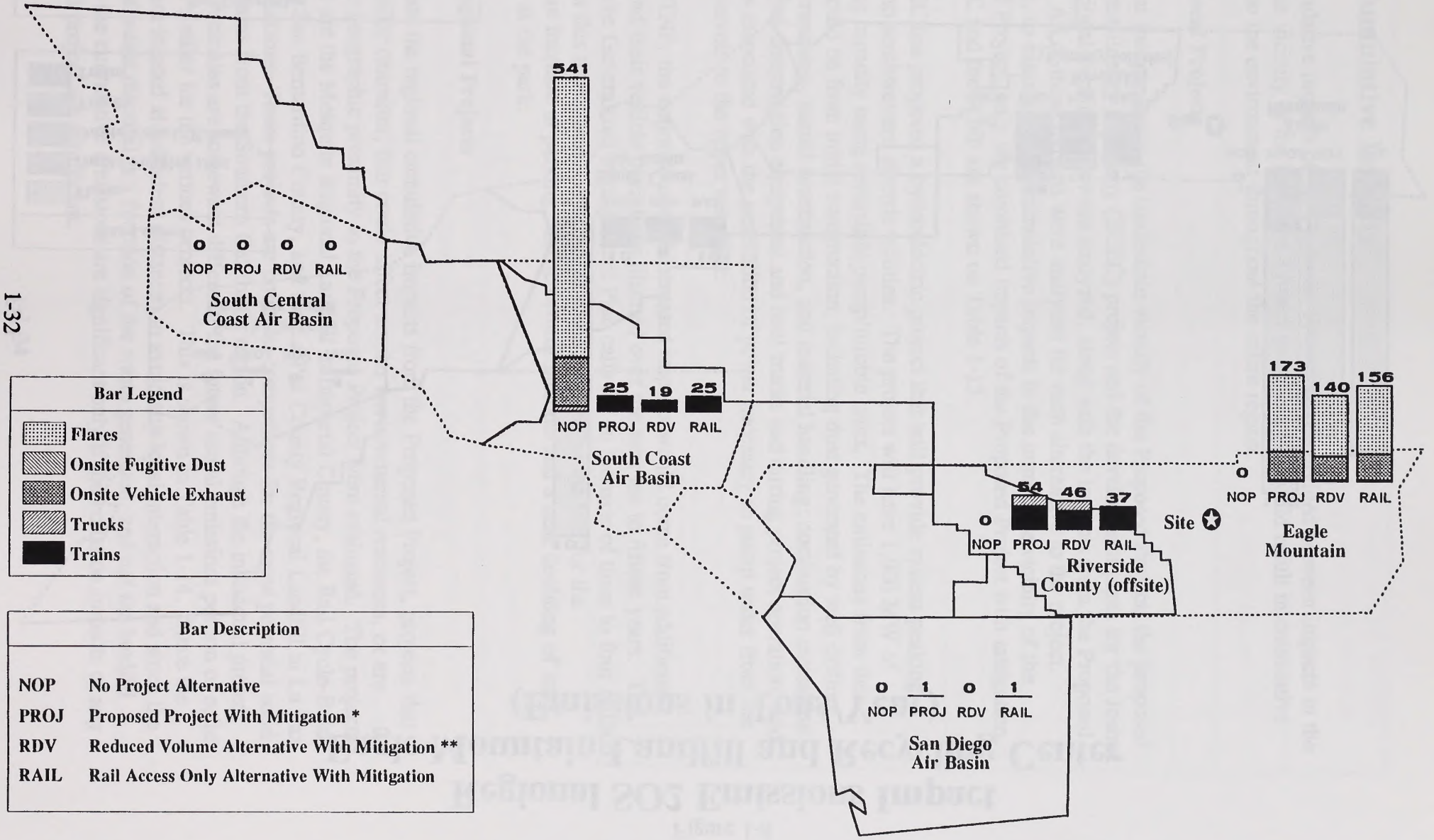


Bar Description	
NOP	No Project Alternative
PROJ	Proposed Project With Mitigation *
RDV	Reduced Volume Alternative With Mitigation **
RAIL	Rail Access Only Alternative With Mitigation

* No Town[illegible] Alternative will have impacts just below these levels while Alternative Roa[illegible]gnment Allternative will have impacts slightly above these levels.
** Landfill on Kaiser Land Only Alternative will have impacts below these levels.

Figure 1-7

Regional VOC Emissions Impact
Eagle Mountain Landfill and Recycling Center
(Emissions in Tons/Year)



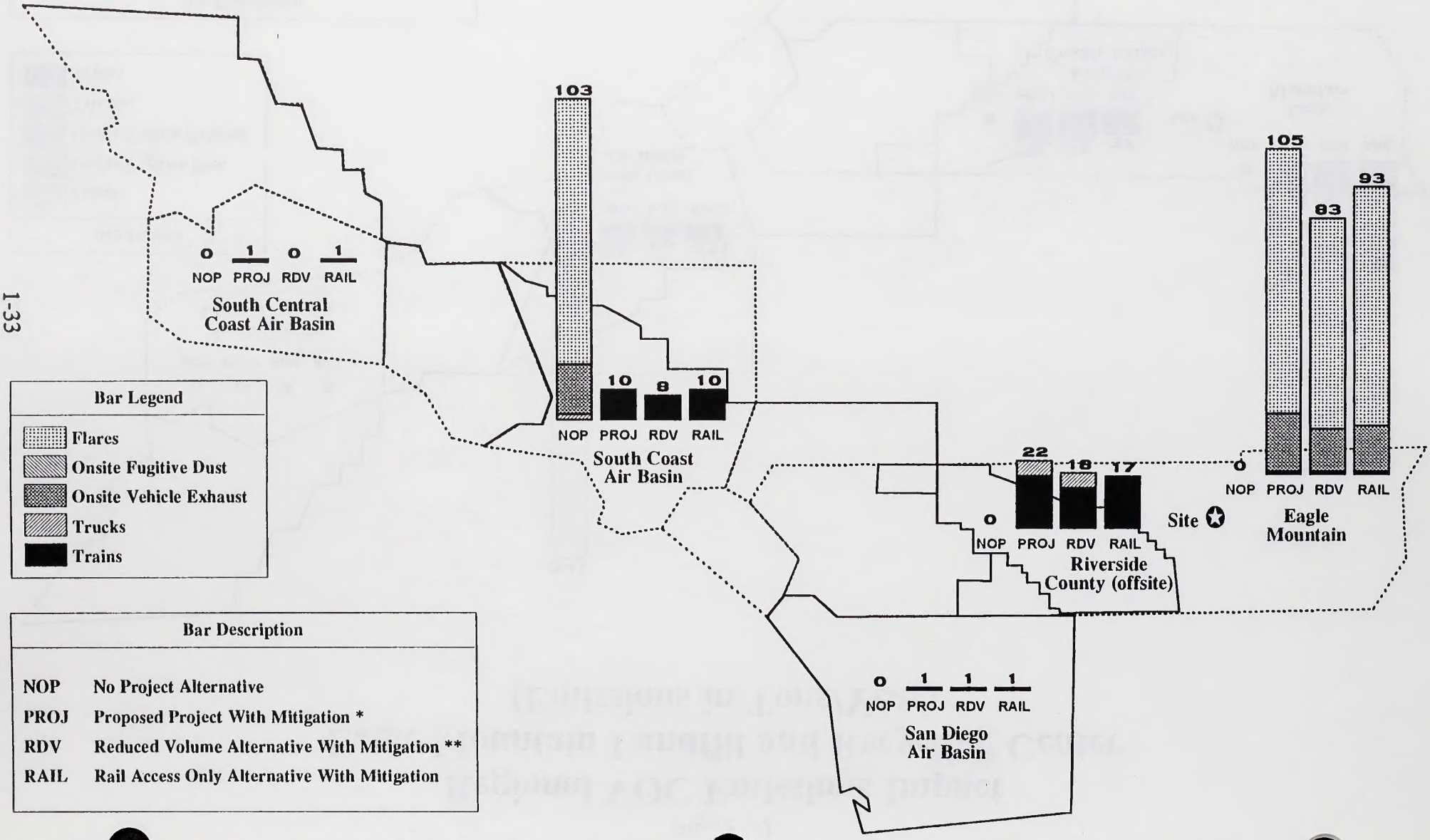
Bar Description	
NOP	No Project Alternative
PROJ	Proposed Project With Mitigation *
RDV	Reduced Volume Alternative With Mitigation **
RAIL	Rail Access Only Alternative With Mitigation

* No Townsite Alternative will have impacts just below these levels while Alternative Road Alignment Allternative will have impacts slightly above these levels.

** Landfill on Kaiser Land Only Alternative will have impacts below these levels.

Figure 1-8

Regional SO2 Emissions Impact
Eagle Mountain Landfill and Recycling Center
(Emissions in Tons/Year)



* No Town[illegible] Alternative will have impacts just below these levels while Alternative Roa[illegible]nment Allternative will have impacts slightly above these levels.
** Landfill on Kaiser Land Only Alternative will have impacts below these levels.

1.7. Cumulative Impacts

The cumulative impacts of the Proposed Project can be divided between impacts in the immediate vicinity of the Proposed Project and those that could result in cumulative impacts to the environment throughout the entire region.

1.7.1 Local Projects

To look at the impacts in the immediate vicinity of the Proposed Project, the proposed Eagle Crest Energy Company (ECEC) project and the development plans for the Joshua Tree National Park (JTNP) were analyzed, along with the impacts from the Proposed Project. All of these impacts were analyzed for each alternative to the project. However, to summarize the cumulative impacts in the immediate vicinity of the Proposed Project, only the combined impacts of the Proposed Project with mitigation, the ECEC and the JTNP are shown on Table 1-13.

The ECEC has proposed a hydroelectric project that will provide system peaking capacity to southwestern electric utilities. The project will have 1,000 MW of generating capacity using reversible pump/turbine units. The emissions from the ECEC would be from initial construction, including dust generated by well drilling, pipeline trenching, tunnel construction, and material handling; combustion emissions from Diesel construction equipment and haul trucks and during project operation; and emissions associated with the generation of power necessary to pump water from the lower reservoir to the upper reservoir.

For the JTNP, the major source of increased impacts would come from additional visitors and their vehicle operations planned over the next ten to fifteen years. The Joshua Tree Generalized Management Plan calls for an increase of three to four million visitors in this time frame. Among the plans included in the EIS for the JTNP is an increase in parking, traffic control pullouts and a near doubling of staff positions at the park.

1.7.2 Regional Projects

To evaluate the regional cumulative impacts from the Proposed Project, projects that are of similar character, that could affect similar environmental resources, or are located in geographic proximity to the Proposed Project were evaluated. The projects evaluated are the Mesquite Regional Landfill in Imperial County, the Rail Cycle-Bolo Station in San Bernardino County, and the La Paz County Regional Landfill in La Paz County, Arizona. These projects are potential competitors for the same potential solid waste streams from the Southern California region. Although the individual project emission estimates are somewhat different, the future actual emissions per ton of solid waste are similar for the various projects. This is shown in Table 1-14. Since the projects are located at sufficient distances to avoid any local interaction and since the amount of waste disposal is a function of the waste generated, and not the landfill capacity, the cumulative emissions are significant only if the emission impacts of any individual project are significant.

Table 1-13
Eagle Mountain Landfill and Recycling Center
Cumulative Impacts for Proposed Project With Mitigation

Project	Daily Emissions (lbs/day)					Annual Emissions (tons/yr)				
	NOx	CO	PM_{10}	VOC	SO_2	NOx	CO	PM_{10}	VOC	SO_2
Initial Construction										
Eagle Mountain	3,473	894	1,668	268	80	N/A	N/A	N/A	N/A	N/A
Eagle Crest	210	842	1,804	316	526	N/A	N/A	N/A	N/A	N/A
Combined	3,683	1,736	3,472	584	606	N/A	N/A	N/A	N/A	N/A
Normal Operation - On-site Emissions										
Eagle Mountain	2,710	2,771	1,483	948	575	494	501	271	173	105
Eagle Crest	3	13	3	5	8	2	1	0	0	0
Joshua Tree[1]	121	1,317	20,245	69	17	14	152	2,336	8	2
Combined	2,834	4,101	21,731	1,022	600	510	654	2,607	181	107
Normal Operation - Total Regional Emissions[2]										
Eagle Mountain	7,027	4,392	1,816	1,384	758	1,282	797	332	252	139
Eagle Crest	60,127	10,068	1,029	27	136	7,056	1,180	121	1,493	15
Joshua Tree[1]	338	3,492	25,064	173	61	39	403	2,892	20	7
Combined	67,492	17,952	27,909	14,284	950	8,377	2,380	3,345	1,765	161

[1] Daily emissions for Joshua Tree Development represent the average daily emissions for emissions in the maximum month of visitation.
[2] For Proposed Project, total regional emissions include train and transfer truck travel outside of the project boundaries as well as on-site emissions. For ECEC, total regional emissions include power plants. For JTNP, total regional emissions include vehicle travel outside of the park.

Table 1-14
Comparison of Total Project Emissions (on- and off-site) per Ton of Solid Waste
(emissions in lbs/ton of MSW)

Project	NOx	ROG	PM_{10}	SOx	CO
Eagle Mountain	0.4	0.1	0.1	0.1	0.2
Mesquite	0.6	0.1	0.03	0.03	0.2
Bolo Station	0.6	0.2	0.2	0.1	0.2
La Paz	0.4	0.02	0.01	0.03	0.05

Note:
Emissions based on landfill capacity of 20,000 tpd for Eagle Mountain and Mesquite, 21,000 tpd for Bolo Station and 12,000 tpd for La Paz. Bolo Station emissions based on boiler use in years 25 and beyond.

The one place where there is an opportunity for the emissions from these various projects to interact is with respect to off-site rail emissions. The rail emission estimates for these projects are compared to those of the Eagle Mountain Project in Table 1-15.

Table 1-15
Comparison of Rail Emissions for Various Projects
All Projects are With Mitigation‡

Facility	NOx	ROG	PM_{10}	SO_x	CO
Maximum Daily Emissions in lbs/day					
Eagle Mountain	3,377	342	206	157	1,170
Bolo Station	7, 882	307	170	563	1,046
Mesquite	7,560	210	140	100	650
La Paz	5089	181	99	371	612
Maximum Annual Emissions in tons/year					
Eagle Mountain	616	62	38	29	214
Bolo Station	1,230	48	27	88	163
Mesquite†	1,380	38	26	88	119
La Paz	929	33	18	68	112

Notes:
‡ Mesquite and Eagle Mountain have daily capacity of 20,000 tons/day of MSW. Bolo Station capacity is 21,000 tons/day. La Paz emissions are for 12,000 tons/day of MSW from Los Angeles area.
† Annual emissions computed assuming 365 day per year operation.

Both the Eagle Mountain and Mesquite landfills will be served by trains leaving the SCAB over the Southern Pacific tracks through Colton and Beaumont Summit. At Ferrum, where the Eagle Mountain MSW will be transferred onto the Eagle Mountain rail spur, the Mesquite Landfill MSW will continue on the SP tracks. The Rail Cycle - Bolo Station project will be served by Santa Fe trains leaving the SCAB over the Cajon Pass. Thus, all three projects will have emissions in both the SCAB and the SEDAB. The emissions in the SCAB will occur over closely located East-West rail corridors. The emissions in the SEDAB will be somewhat separated. The Rail Cycle-Bolo Station rail emissions will be in the northern portion of the SEDAB. The Eagle Mountain Landfill rail emissions will be in the central portion of the SEDAB and the Mesquite Landfill rail emissions will be in the central and southern portions of the SEDAB. However, these emissions are not necessarily additive. As stated above, the amount of waste produced is not determined by the landfill capacity; it is determined by the amount of waste generated. Decisions regarding waste disposal areas will affect the distribution of waste among the proposed landfill projects, not the total amount of waste handled. It is therefore reasonable to assume the regional emissions would be approximately constant regardless of how many projects are built.

PART 2
ENVIRONMENTAL SETTING

2.1 Geography and Topography

The Project Site will encompass approximately 5,100 acres in northeastern Riverside County, of which approximately 400 acres are the Eagle Mountain townsite and approximately 4,700 acres are the total landfill area. Of this latter amount, approximately 2,158 acres will be used for actual landfilling. The site is bordered on the north by the northeastern ridge of the Eagle Mountains, on the east by Chuckwalla Valley, on the south by the townsite community of Eagle Mountain, and on the west by the Eagle Mountains. To the south, at a distance of about 9 to 11 miles, lie Lake Tamarisk and Desert Center. Due west of the site, about 70 miles, lie Palm Desert and Palm Springs, and beyond, at a distance of approximately 150 miles, is Los Angeles. Joshua Tree National Park is approximately 1.5 miles north and southwest of the Project Site. A map of the region is shown in Figure 2-1. A site map is shown in Figure 2-2.

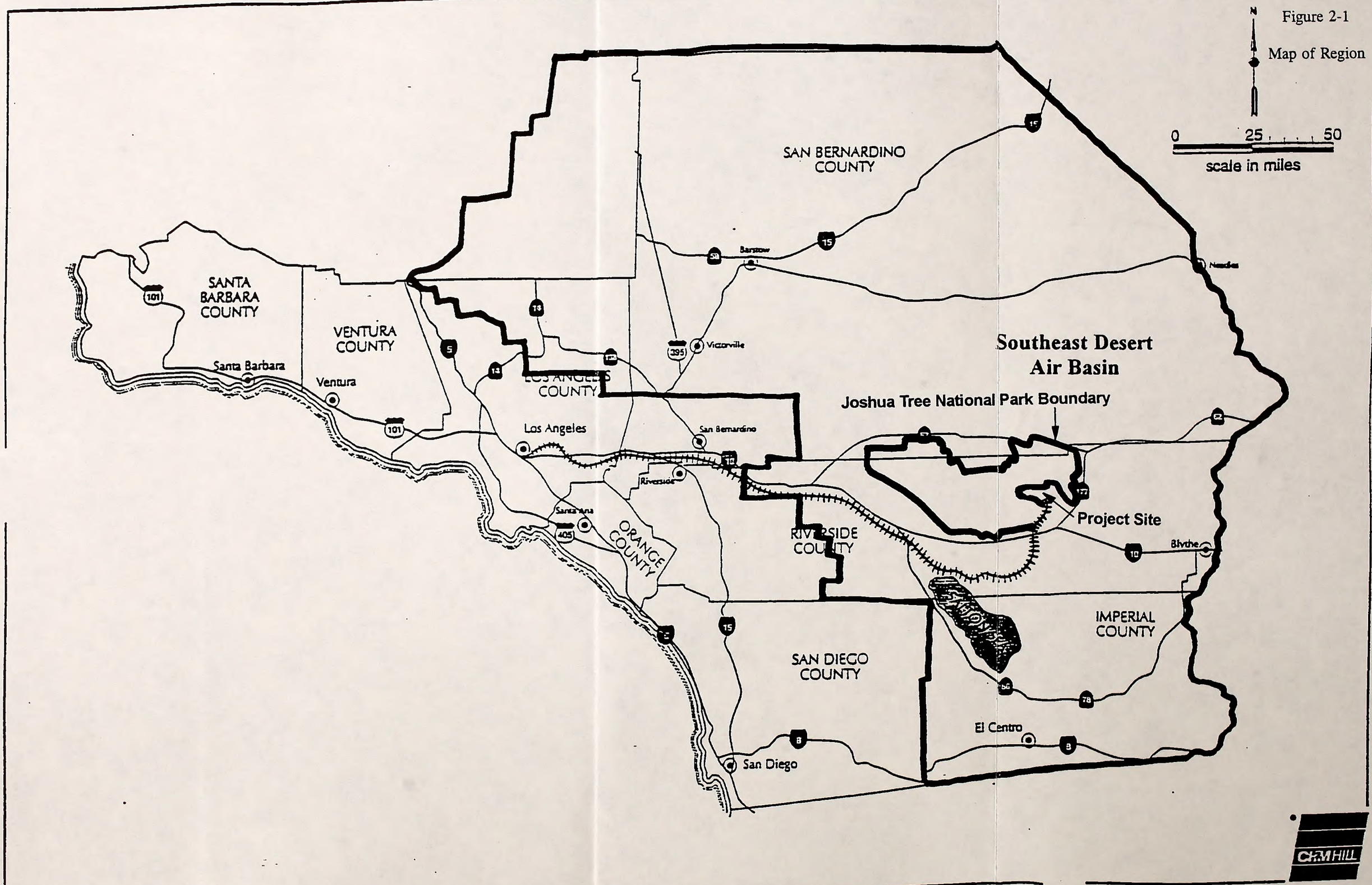
The topography of the Project Site varies from level, open desert to rugged mountain terrain, including the East Pit mine and tailing and overburden piles surrounding the open pit mine. Elevations range from 2,800 feet above Mean Sea Level (MSL) in the northwest portions of the site to about 700 feet in the bottom of the East Pit. Elevations in the eastern and southern portions of the site range from approximately 1,800 feet above MSL in the southwestern corner to about 1,000 feet above MSL in the southeastern corner. The Project Site is located in the Southeast Desert Air Basin. A detailed description of this Air Basin and the Joshua Tree National Park is given in the following sections. Because air pollutants can be transported between Air Basins and because rail hauling of waste to and from the Project may pass through several Southern California Air Basins, the following sections also discuss the South Coast, South Central Coast, and San Diego Air Basins.

2.1.1 Southeast Desert Air Basin

The Southeast Desert Air Basin (SEDAB) is composed of the eastern parts of San Bernardino, Riverside, Kern, and Los Angeles Counties, and all of Imperial County. It is separated from the coastal regions by mountain ranges, which also provide a climatological boundary. Elevations within the basin range from 235 feet below sea level at the Salton Sea, to 11,485 feet above MSL at the summit of Mt. San Gorgonio. However, the topography of the basin is generally flat and slopes from 2,500 feet above MSL in the west to below sea level in the east. The basin is naturally divided into two distinct parts: the High Desert (Mojave) and the Low Desert (Colorado).

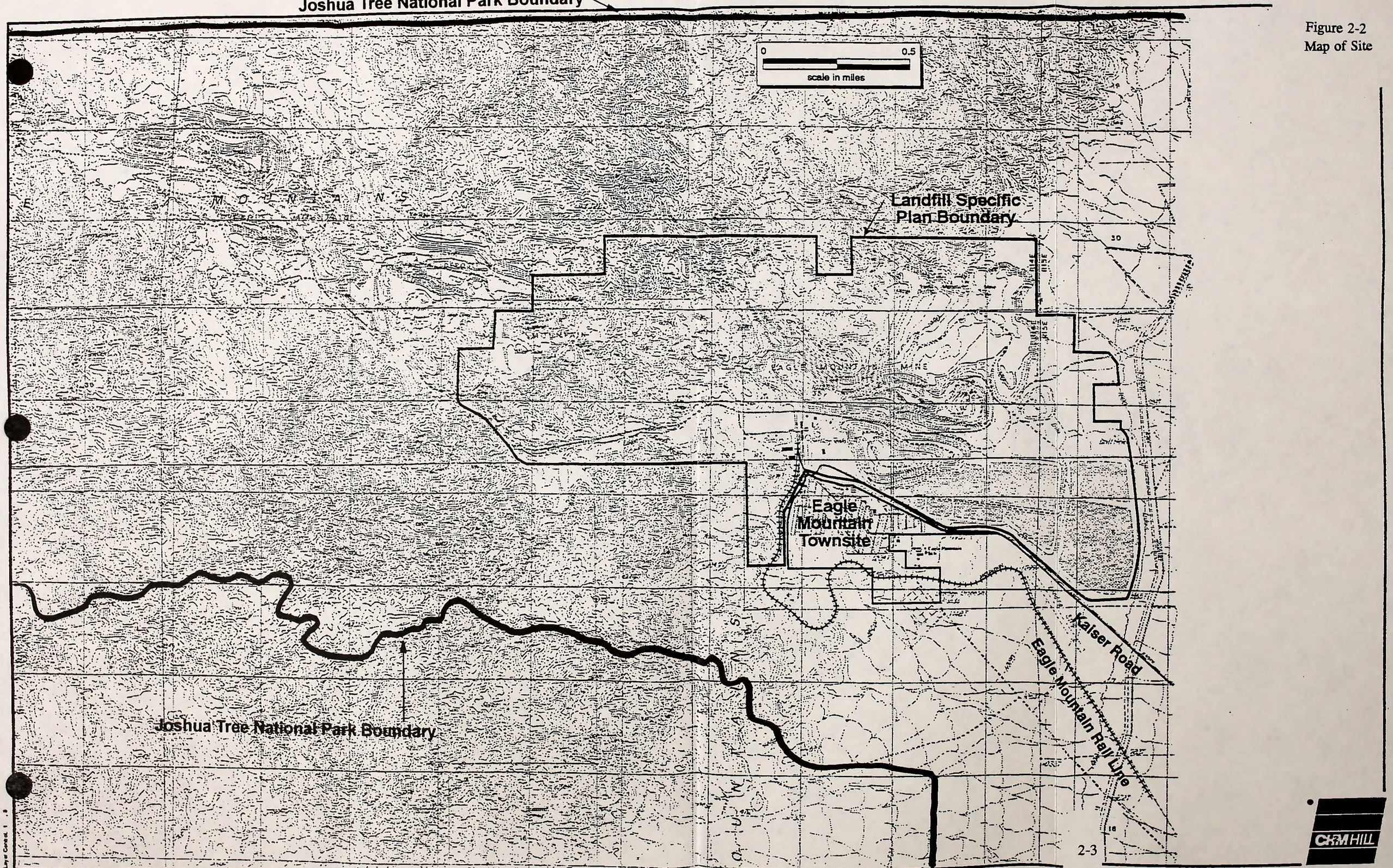
Figure 2-1

Map of Region



CH2MHILL

Figure 2-2
Map of Site



em15231.T6.20 drainage 8/95

In July 1995, the Governor signed into law Assembly Bill 421, which directs the California Air Resources Board to establish new air basin boundaries to create a Mojave Desert Air Basin from within the current Southeast Desert Air Basin. The new Mojave Desert Air Basin is expected to include the desert portions of Kern County, Los Angeles County, San Bernardino County, and the extreme eastern portion of Riverside County (near Blythe). The Project Site and the southern portion of Joshua Tree National Park will remain within the Southeast Desert Air Basin, while the northern portion of the Joshua Tree National Park will be within the new Mojave Desert Air Basin. The new air basin boundaries will not be effective until later in 1996, and only after adoption by the California Air Resources Board. This analysis is based on the current air basin boundaries in effect. The change in air basin boundaries will not result in a change in any of the regulations affecting the Project, nor would it affect any of the analyses or conclusions presented below.

High Desert (Mojave). In the northern part of the Southeast Desert Air Basin lies the Mojave Desert, which gradually merges into the Great Basin without a distinct transition. This region is sheltered from maritime weather influences by mountain barriers extending from north to south. The southern end of the Sierra Nevada and the Tehachapi Mountains form a border on the northwest. To the southwest, the Sawmill, Liebre, and Sierra Pelona Mountains merge with the San Gabriel and San Bernardino Mountains to the south. Entry points into the Mojave where inter-basin air transport takes place include Tehachapi Pass, Soledad Canyon, Cajon Pass, Morongo Valley, and Yucca Valley.

Low Desert (Colorado). The Imperial and Coachella Valleys constitute the major portion of the southern part of the SEDAB. These valleys form a great depression of roughly V-shaped ground plane. This immense structural trough has its apex to the north not far from where the San Jacinto and San Bernardino Mountains meet at San Gorgonio Pass. The trough opens to the southeast, where it is continuous with the larger and much deeper depression occupied by the Gulf of Lower California. Rising more or less abruptly from the southwestern and northwestern sides of the Imperial and Coachella Valleys are bold mountains that restrict inter-basin transport of air pollution and marine air. The Peninsular Ranges border the southwestern margin, while the southeastern portion of the San Bernardino Mountains and various elevated blocks belonging to the Mojave Desert Province lie along the northeastern side. The Salton Basin lies in the southeasternmost section of the Imperial-Coachella Trough and, although now separated, it is continuous with the depression under the Gulf of Lower California. The San Gorgonio Pass has a maximum elevation of about 2,500 feet above MSL and represents a passageway between the interior and coastal portions of southern California.

2.1.2 Joshua Tree National Park*

The Joshua Tree National Park is located in the Mojave and Colorado Deserts of southern California. It lies along the east-west transverse ranges of the Little San Bernardino Mountains. The south boundary follows the base of these mountains along the northern perimeter of the Coachella Valley; the north boundary is defined by the Morongo Basin. The park is in San Bernardino and Riverside Counties.

The compressed transition zone between the Mojave and Colorado Deserts makes it possible to cross from one desert to the other within less than 65 miles. The park contains all or portions of numerous mountain ranges including the San Bernardino, Cottonwood, Hexie, Pinto, Coxcomb, and Eagle ranges. The eastern portion averages 2,000 feet above MSL while the western half is mostly above 4,000 feet MSL. Extremes in elevation range from 1,000 feet MSL at Pinto Well to 5,900 feet MSL at Quail Mountain. Major valleys include the Pinto Basin, Juniper Flats, Covington Flats, Pleasant, Queen, and Lost Horse.

2.1.3 South Coast Air Basin

The South Coast Air Basin (SCAB) includes all of Orange County and the metropolitan areas of Los Angeles, San Bernardino, and Riverside Counties. It is bounded on the northwest by Ventura County and on the south by San Diego County. The northern boundary runs roughly along the Angeles National Forest line north of the crest of the San Gabriel and San Bernardino Mountains. The eastern border runs north-south through the San Bernardino and San Jacinto mountains, although the Banning Pass area is excluded from the Air Basin. The remaining boundary line is the entire shoreline of Los Angeles and Orange Counties.

Within the rim of high mountains that rise to altitudes greater than 11,000 feet MSL, the basin is a coastal plain with connecting broad valleys and low hills. On most days, the net wind flow is from west to east, which results in air pollution source areas near the coast impacting receptor areas inland to the east. This source-receptor relationship is compounded by the population distribution in the basin. The highest population, the greatest population density, and the majority of industries, commerce, and streets and freeways are located in the principal source areas in the western portion of the basin.

---

* From "Final General Management Plan/Development Concept Plans/Environmental Impact Statement for Joshua Tree National Park," April 1995, United States Department of the Interior, National Park Service.

2.1.4 South Central Coast Air Basin

The South Central Coastal Air Basin (SCCAB) includes San Luis Obispo, Santa Barbara, and Ventura Counties. San Luis Obispo County and that portion of Santa Barbara County north of the Santa Ynez Mountains is called the northern zone of the SCCAB. The southern zone of this air basin includes Ventura County, the Santa Barbara channel with its off shore oil and gas activities, and the southern central coastal strip of Santa Barbara County.

The Northern Zone. The northern section of the SCCAB is bordered by Monterey County to the north, Santa Barbara County to the south, the Pacific Ocean to the west, and the San Joaquin Valley Air Basin to the east. The geographical features include the coastal plateau along the Pacific Ocean which has 75% of the population and most of the emissions in the northern zone; the upper Salinas River Valley; and the eastern plain, consisting mostly of the Carrizo Plain, a large drainage basin. The Carrizo Plain borders the Temblor Mountain range to the east which lies in a northwest-southeast direction along the border of the San Joaquin Valley Air Basin. The only break in the range occurs at the Cholame Pass in the northern end of the mountain range.

The Southern Zone. The southern section of the SCCAB includes the Santa Barbara coastal strip that is bordered on the inland side by mountain ridges extending upwards to about 4,000 feet MSL. To the south, the 2,500-3,000 foot Santa Monica Mountains go down to the sea at Point Mugu, blocking any direct connection between Ventura and the Los Angeles Basin to the east. Just north of the Santa Monica Mountains is the east-west Russel Valley; further north, over the Simi Hills, the Simi Valley connects the Oxnard plain with the San Fernando Valley. Still further inland and northward, the Santa Clara Valley runs eastward, connecting with the Castaic, Saugus, Newhall area which is just north of the San Fernando Valley.

2.1.5 San Diego Air Basin

The San Diego Air Basin (SDAB) consists of San Diego County. The SDAB is bounded on the north by the SCAB, on the east by the SEDAB, on the west by the Pacific Ocean, and on the south by the Mexican state of Baja California. The County is divided by the Laguna Mountain Range which runs approximately parallel to the coast about 45 miles inland and separates the coastal area from the desert portion of the County. The Laguna Mountains reach peaks of over 6,000 feet MSL with Cuyamaca Peak rising to 6,515 feet MSL, the highest point in the County. The coastal region is made up of coastal terraces which rise up from the ocean into wide mesas changing into the Laguna Foothills farther east. Going still farther east, the topography gradually rises up to rugged mountains. On the east side, the mountains drop off rapidly to the Anza-Borrego Desert which is characterized by several broken mountain ranges with the desert valley in between. To the north of County are the

Santa Ana Mountains which run parallel to the coast of the Orange County turning east to join with the Laguna Mountains near the San Diego-Orange County border.

2.2 Climate and Meteorology

As previously discussed, the Project Site is located in the SEDAB, which is among some of the hottest and driest areas in the state of California. The seasons are generally marked by differences in temperature rather than substantial differences in rainfall. Seasonal temperature differences are large, characteristic of a continental climate. Average monthly temperatures at Eagle Mountain range from about 54° F in January to 94° F in July (SCAQMD, ARB). The average monthly high temperature ranges from over 65° F in January to about 105° F in July, while the main monthly low temperature ranges from about 45° F in January to about 83° F in July. Average annual precipitation for the project site totals about 3.8 inches.

Surface weather data for 17 hours a day are available at Palm Springs Municipal Airport. Surface data are also available at the U.S. Marine Corps air base at Twenty-Nine Palms, but the data are often not collected on a regular basis.

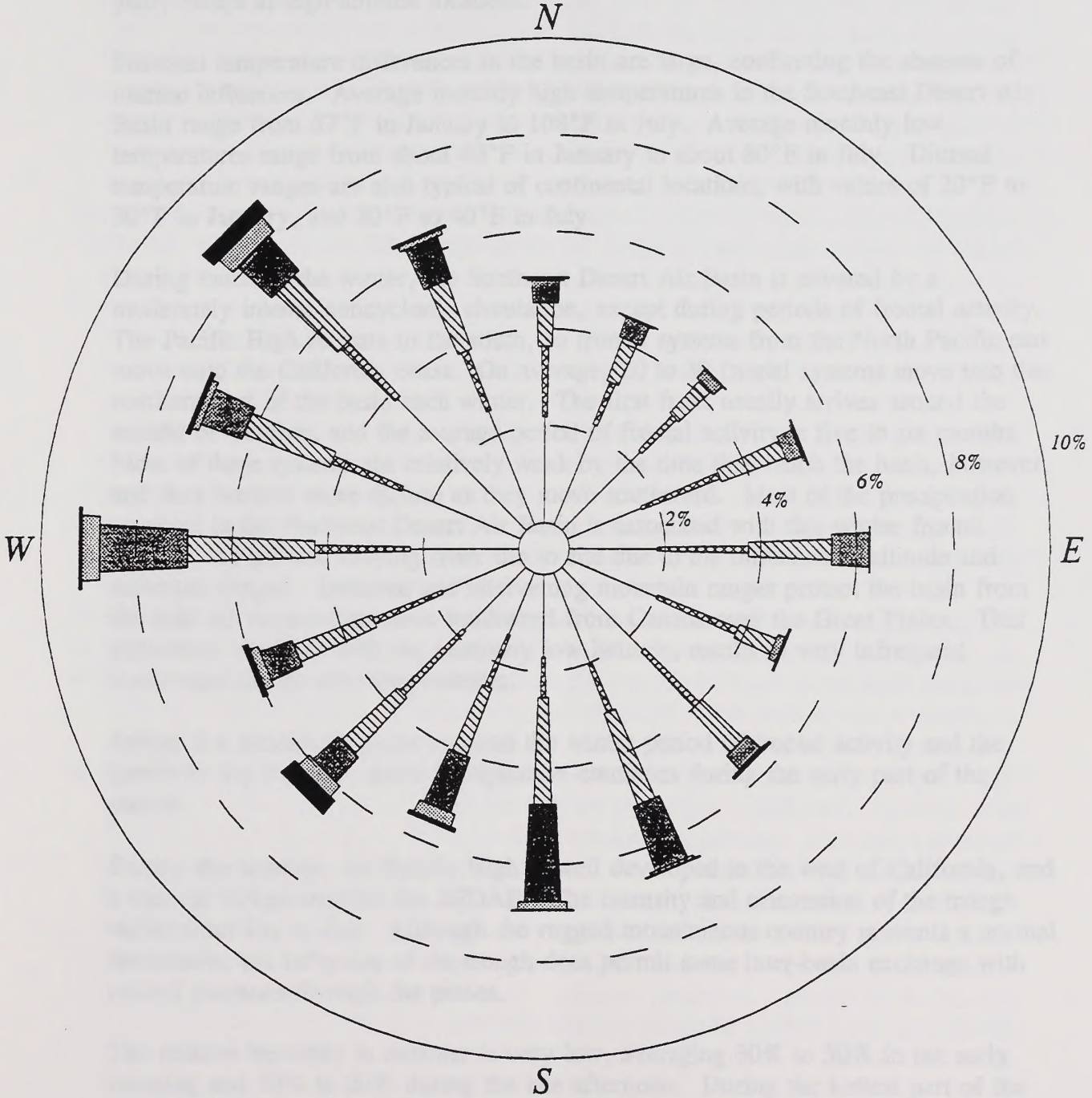
Mine Reclamation Corporation (MRC) conducted on-site meteorological monitoring between 1990 and 1992 and ambient air quality monitoring between 1990 and 1991. The meteorological monitoring, supervised by Engineering-Science of Pasadena, CA, included the collection of wind speed, wind direction, and temperature data measured on-site. Data Systems Services Inc. of San Diego was contracted by MRC to conduct quarterly audits of the meteorological monitoring equipment used by Engineering-Science at the Project Site. The Ambient Monitoring Data Summaries prepared by Engineering-Science indicate that four quarterly audits of the monitoring equipment were conducted at acceptable intervals. Because the data were collected on-site, the weather data are representative of the weather at the site.

Wind patterns in the area of the site can be seen in Figure 2-3, which is a wind rose for the on-site weather station. Westerly winds predominate at the Project Site. The winds are typically persistent with calm conditions (i.e., wind speeds less than three miles per hour) rarely occurring; about 9 percent of the winds are from due west, and almost 22 percent come from the west-southwest through west-northwest. Southeasterly flows do occur during the month of August, however, when the influence of "monsoonal" flow is felt in the deserts of California. During the summer months, the southwestern monsoon brings rains to the plateaus and deserts of Arizona and New Mexico, to the Rocky Mountains, and even as far north as Canada. The southwestern monsoon occasionally brings rain to the California deserts as well, particularly when subtropical mesoscale "easterly waves" are active, especially in the month of August.

Figure 2-3

Eagle Mtn 1990-91 Set 2

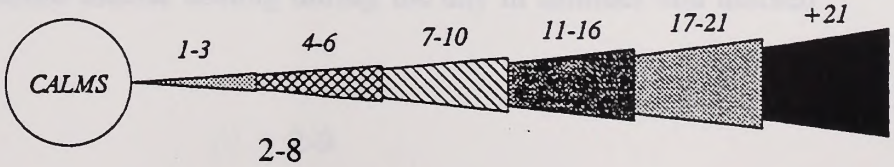
January 1-December 31; Midnight-11 PM



CALM WINDS 0.00%

WIND SPEED (KNOTS)

NOTE: Frequencies indicate direction from which the wind is blowing.



2.2.1 Southeast Desert Air Basin

The Southeast Desert Air Basin includes the hottest and driest parts of California, with a climate characterized by hot, dry summers and relatively mild winters. Rainfall is scant in all seasons, so differences between the seasons are marked principally by differences in temperature and not by substantial rainfall during any season. Average annual precipitation in the basin is in the range of 2 to 6 inches per year, except at high-altitude locations.

Seasonal temperature differences in the basin are large, confirming the absence of marine influences. Average monthly high temperatures in the Southeast Desert Air Basin range from 57°F in January to 108°F in July. Average monthly low temperatures range from about 40°F in January to about 80°F in July. Diurnal temperature ranges are also typical of continental locations, with values of 20°F to 30°F in January, and 30°F to 40°F in July.

During much of the winter, the Southeast Desert Air Basin is covered by a moderately intense anticyclonic circulation, except during periods of frontal activity. The Pacific High retreats to the south, so frontal systems from the North Pacific can move onto the California coast. On average, 20 to 30 frontal systems move into the northern part of the basin each winter. The first front usually arrives around the middle of October, and the average period of frontal activity is five to six months. Most of these systems are relatively weak by the time they reach the basin, however, and they become more diffuse as they move southward. Most of the precipitation received in the Southeast Desert Air Basin is associated with this winter frontal activity, the amount varying from site to site due to the influence of altitude and mountain ranges. Distance and intervening mountain ranges protect the basin from the cold air masses that move southward from Canada over the Great Plains. This protection, together with the relatively low latitude, results in very infrequent occurrence of sub-zero temperatures.

Spring is a transition season between the winter period of frontal activity and the generally dry summer; some precipitation continues during the early part of the season.

During the summer, the Pacific High is well developed to the west of California, and a thermal trough overlies the SEDAB. The intensity and orientation of the trough varies from day to day. Although the rugged mountainous country prevents a normal circulation, the influence of the trough does permit some inter-basin exchange with coastal locations through the passes.

The relative humidity in summer is very low, averaging 30% to 50% in the early morning and 10% to 20% during the late afternoon. During the hottest part of the day, humidities below 10% are common. Despite the higher amounts of moisture in the air in August, this does not necessarily translate to higher relative humidity. These conditions promote intense heating during the day in summer and marked

cooling at night, and the intense solar radiation is highly conducive to the formation of photochemical smog.

Fall is the transition period from the hot summer back to the season of frontal activity, but it is still very dry and temperatures are still mild.

Desert regions tend to be windy during the summer, since little friction is generated between the moving air and the low, sparse vegetation cover. In addition, the rapid daytime heating of the lower air over the desert leads to convective activity. This exchange of lower and upper air tends to accelerate surface winds during the warm part of the day when convection is at a maximum. During winter, however, the rapid cooling in the surface layers at night retards this exchange of momentum, and the result is often a high frequency of calm winds.

During all seasons, the prevailing wind direction is predominantly from the south and west. At specific sites, the prevailing winds can be modified somewhat by the effect of orographic flows, i.e., upslope in daytime and downslope at night. Only during the winter at Victorville and summer at El Centro does the wind have a significant easterly component. This southeasterly flow into the Imperial Valley presents a possible entry point of pollutants from more populated areas of nearby Mexico.

The mixing depth, i.e., the height available for dispersion of airborne pollutants emitted near the surface, is limited by the occurrence of temperature inversions. A temperature inversion is a layer of air in which the temperature increases with height. Thus, knowledge of the frequency and height of temperature inversions in the basin provides insight into the dispersion potential of the atmosphere.

The temperature inversion conditions of the SEDAB are quite different from those of the coastal regions of California. On coastal regions, there can be strong temperature inversion conditions even on sunny days due to the influence of cool marine air. This condition does not exist in the SEDAB due to the lack of marine air influences. When a subsidence inversion exists over the basin, the height of the inversion base lies some 6,000 to 8,000 feet above the surface. There is a low frequency of elevated inversions in all seasons. Nighttime surface inversions in the desert are common, however, occurring with high frequency in all seasons (ARB 1975). Mixing heights are predominantly 1000 feet or less. These inversions are caused by nighttime radiational cooling of the land surface in contact with overlying air that cools more slowly. They tend to be destroyed early in the day in summer, due to intense solar radiation and heating of the land surface, and the great mixing heights result in rapid dilution of pollutants. In winter, however, they tend to persist throughout much of the day, limiting mixing in the lower atmosphere to heights of 200 to 2,000 feet above the surface.

2.2.2 Joshua Tree National Park

Since the Joshua Tree National Park is located in the SEDAB just to the north and southwest of the Proposed Site, the above discussions regarding climate and meteorology for the SEDAB and Project Site apply to the Park as well.

2.2.3 South Coast Air Basin

The South Coast Air Basin lies within the semi-permanent high pressure zone of the eastern Pacific Ocean. Typical of coastal strips along the western shores of continents at lower latitudes, the region is characterized by warm, dry summers and mild winters of moderate rainfall. The warmest month is August, with average temperatures in the low 70s. January is the coldest month, with minimum temperatures averaging in the low 40s. Summertime maximum temperatures range from about 75°F at the coast to the 90s inland. Winter lows range from the 30s at inland and mountain locations to the mid-40s near the coast.

Precipitation in the basin is associated with winter storms that migrate inland from the Pacific Ocean. Nearly 90 percent of the annual rainfall in the basin occurs during the period from November to April. Precipitation patterns show a strong orographic influence. The annual average rainfall is 11 to 15 inches in the coastal plain and inland valleys, up to 21 inches in the foothills, and greater than 50 inches in the mountains.

During the dry season, and to a lesser degree during the winter, the daily circulation pattern in the basin is typified by a daytime sea breeze blowing onshore and a nighttime land breeze moving offshore. Generally, the sea breeze is about twice as strong as the land breeze, and summer wind speeds average slightly higher than winter wind speeds. Throughout the year during the night, a drainage flow exists as cool air from the nearby mountain slopes drains down and back toward the ocean.

On occasion during the fall and winter months, a high pressure system develops over Nevada and Utah and pushes air southward over the San Gabriel and San Bernardino mountains. The resulting wind is known as a Santa Ana wind. Santa Ana winds can be very strong, with wind speeds through the mountain passes sometimes exceeding 60 mph (SCAQMD 1980), and are usually warm and dry. They tend to clear the basin of accumulated air pollutants, but can also cause dust storms and high particulate levels.

Air in the South Coast basin is generally moist, due to the presence of a marine air layer. Relative humidity during the summer usually ranges from 70 to 80 percent during the night, and 50 to 60 percent in the daytime. During winter, daytime relative humidity is usually between 50 and 60 percent, while nighttime relative humidity is approximately 75 percent.

The vertical dispersion of air pollutants in the South Coast Air Basin is limited by the presence of a persistent temperature inversion (a temperature increase with altitude) in the lower atmosphere. For that reason, the base of the inversion is called the "mixing height" of the atmosphere. Usually, inversions are lower before sunrise than during the daylight hours. The mixing height normally increases during the day as the base of the inversion erodes because of surface heating.

Along the coast of southern California, relatively cool surface air temperatures, coupled with warm, dry, subsiding air from aloft, produce inversions about 87 percent of the time in the early morning. The average occurrence of ground-based inversions is 11 days per month, ranging from two days in June to 22 days in December and January. High inversions, with heights up to 2,500 feet MSL, occur about 20 days each month. Mixing heights of 3,500 feet MSL or less occur about 191 days each year (SCAQMD).

2.2.4 South Central Coast Basin

The South Central Coast Air Basin (SCCAB) has a maritime climate characterized by relatively warm days, cool nights, and moderate humidity. The meteorology of the basin is strongly influenced by the existence of a persistent high pressure area residing over the Pacific Ocean. Seasonal variations in the strength and location of the high pressure system, along with circulation driven by land and sea temperature differences, affect the local winds. Prevailing winds in the SCCAB are westerly due to the Pacific high pressure area (Pacific High) during the spring, summer and fall. In the northern part of the SCCAB, the winds tend to be from the west-northwest; in the southern half (Santa Barbara and southward), they tend toward west-southwest. In winter, when the Pacific High moves south and its influence weakens, the winds are frequently easterly. Along the coast, there is also a sea/land breeze pattern from day to night. Average wind speeds are generally low.

In the coastal areas of the basin, monthly average temperatures vary only about 13 degrees from winter to summer, typical temperatures range from a low of about 54°F in January to a high of about 67°F in August. Average daily maximum temperatures range from about 66°F in January to about 76°F in August, while minimum temperatures vary from about 44°F in January to about 58°F in August. Extreme maximum and minimum temperatures recorded between 1951 and 1980 are 103°F and 28°F, respectively. In the areas of the basin further inland, temperatures are very similar to the coastal area, but exhibit slightly larger diurnal and seasonal variations, with monthly average temperatures varying about 22°F from winter to summer.

Approximately 95 percent of the precipitation in the Oxnard-Ventura area occurs during the months of November through April in connection with Pacific storm fronts migrating inland, averaging between about 1 and 4 inches per month. Precipitation in the summer is sparse, with an average of about only 0.01 inches for July, average annual precipitation is about 15 inches. The seasonal pattern of rainfall is the same throughout the basin. In the Coastal Range, Ojai receives an average of about 26

inches annually. San Luis Obispo receives an average of about 23 inches, Santa Barbara receives about 18 inches, Oxnard receives about 15 inches, and Santa Maria receives about 12 inches.

2.2.5 San Diego Air Basin

The San Diego Air Basin (SDAB) has a mild maritime climate very similar to that of the SCCAB. Strong winds are infrequent in the SDAB. Prevailing winds are west-northwesterly in the spring, summer and early fall due to the influence of the Pacific High. Hot, dry easterly Santa Ana winds occasionally blow for several days at a time in the fall, causing higher than normal temperatures. There is also a diurnal sea/land breeze regime in the coastal region.

In the coastal areas of the Basin, the average annual temperature is about 64°F, with monthly averages ranging from about 57°F to 72°F. Daily average temperatures range from lows of about 48°F to 68°F to highs of about 65°F to 78°F. During the period from 1941 to 1984, the record high was 111°F and the record low was 29°F. Temperatures in the SDAB increase toward the inland areas, and daily temperature ranges become greater.

The average annual precipitation in the coastal areas of the Basin is about 9 inches. More than 80 percent of this falls between November and March. Seasonal rainfall increases with elevation and distance from the ocean, with the mountains to the north and east receiving annual averages of 20 to 40 inches.

2.3 Existing Air Quality - Overview

The U.S. Environmental Protection Agency has set national ambient air quality standards (NAAQS) for ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, 10-micron particulate matter (PM_{10}), and airborne lead. An area where an NAAQS is exceeded more than three times in three years can be considered a "nonattainment area" subject to planning and pollution control requirements that are more stringent than normal requirements.

The State of California Air Resources Board (ARB) has set ambient air quality standards to protect public health and welfare. Standards have been set for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, sulfates, PM_{10}, airborne lead, hydrogen sulfide, and vinyl chloride, at levels designed to protect the most sensitive members of the population, particularly children, the elderly, and people who suffer from lung or heart diseases. ARB carries out control program oversight activities, while local air pollution control districts have primary responsibility for air quality planning and enforcement. The ARB designates the attainment status of areas with respect to the state air quality standards, based on criteria adopted by the ARB and contained in Title 17 of the California Code of Regulations.

Both state and national air quality standards consist of two parts: an allowable concentration of a pollutant, and an averaging time over which the concentration is to be measured. The allowable concentrations are based on the results of studies of the effects of the pollutants on human health, crops and vegetation, and, in some cases, damage to paint and other materials. The averaging times are based on whether the damage caused by the pollutant is more likely to occur during exposures to a high concentration for a short time (one hour, for instance), or to a relatively lower average concentration over a longer period (8 hours, 24 hours, or one month). For some pollutants there is more than one air quality standard, reflecting both its short-term and long-term effects. Table 2-1 presents the state and national ambient air quality standards for selected pollutants.

2.4 Criteria Pollutants - Air Quality Trends

2.4.1 Ozone

Ozone (O_3) is an end product of complex reactions between reactive organic gases (ROG) or non-methane hydrocarbons (NMHC) and oxides of nitrogen (NOx) in the presence of intense ultraviolet radiation. ROG and NOx emissions from millions of vehicles and stationary sources, in combination with daytime wind flow patterns, mountain barriers, a persistent temperature inversion, and intense sunlight, result in high ozone concentrations.

Southeast Desert Air Basin. Ozone is a problematic air contaminant in the Southeast Desert Air Basin. A significant portion of the ozone (and ozone precursors) in the basin is transported from the heavily populated South Coast basin to the west (ARB). Maximum ozone concentrations in both the South Coast basin and the SEDAB usually are recorded during the summer months. In the SEDAB, maximum ozone concentrations historically have been measured at the Banning monitoring station (in San Gorgonio Pass) and Hesperia monitoring station (near Cajon Pass). Both of these stations are close to the SEDAB boundary with the South Coast basin, where readings would be expected to be higher than in other areas in the SEDAB.

Table 2-2 shows the California and federal air quality standards for ozone and the maximum levels recorded in the SEDAB in the period 1984-1994. The data show that state and federal ozone air quality standards are exceeded roughly one-third to one-half the days in the year. Figures 2-4 and 2-5 show, respectively, the long-term trend of the maximum one-hour ozone concentrations and of violations of ozone air quality standards in the SEDAB. The maximum hourly concentrations have declined slightly since 1973, from about 0.28 ppm to about 0.23 ppm. The basin is classified as a severe nonattainment area for ozone under the state standards. Under the federal

Table 2-1
Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards Concentration	National Standards Concentration
Ozone	1 hour	0.09 ppm	0.12 ppm
Carbon Monoxide	8 hours	9.0 ppm	9 ppm
	1 hour	20 ppm	35 ppm
Nitrogen Dioxide	Annual Average	-	0.053 ppm
	1 hour	0.25 ppm	-
Sulfur Dioxide	Annual Average	-	80 $\mu g/m^3$ (0.03 ppm)
	24 hours	0.04 ppm (105 $\mu g/m^3$)	365 $\mu g/m^3$ (0.14 ppm)
	3 hours	-	1300 $\mu g/m^3$ (0.5 ppm)
	1 hour	0.25 ppm	-
Suspended Particulate Matter (10 Micron)	Annual Geometric Mean	30 $\mu g/m^3$	-
	24 hours	50 $\mu g/m^3$	150 $\mu g/m^3$
	Annual Arithmetic Mean	-	50 $\mu g/m^3$
Sulfates	24 hours	25 $\mu g/m^3$	-
Lead	30 days	1.5 $\mu g/m^3$	-
	Calendar Quarter	-	1.5 $\mu g/m^3$

Table 2-2
Ozone Levels in the Southeast Desert Air Basin

1984-1994
(parts per million - ppm)

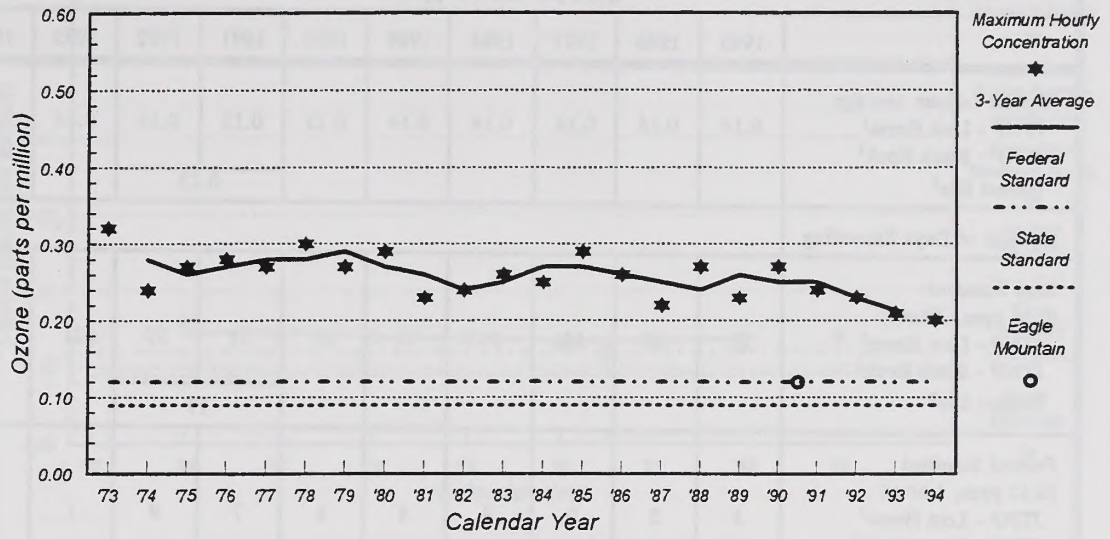
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Highest 1-Hour Average	0.25	0.29	0.26	0.22	0.24	0.23	0.27	0.24	0.23	0.21	0.26
Highest On-Site 1-Hour Average							0.12[1]				
Number of Days Exceeding											
State Standard (0.09 ppm, 1-hour)	166	166	161	166	188	176	149	149	167	165	167
Federal Standard (0.12 ppm, 1-hour)	92	111	115	101	124	111	89	81	85	88	88

Source: California Air Quality Data, Annual Summary, California Air Resources Board
1. Highest ozone concentration measured at Eagle Mountain between March 1990 and April 1991.

standards, Victorville is a severe-17 nonattainment area and all other areas are unclassified or attainment. The Project Site is located in an area that has been classified as attainment/unclassified for the federal ozone standards.

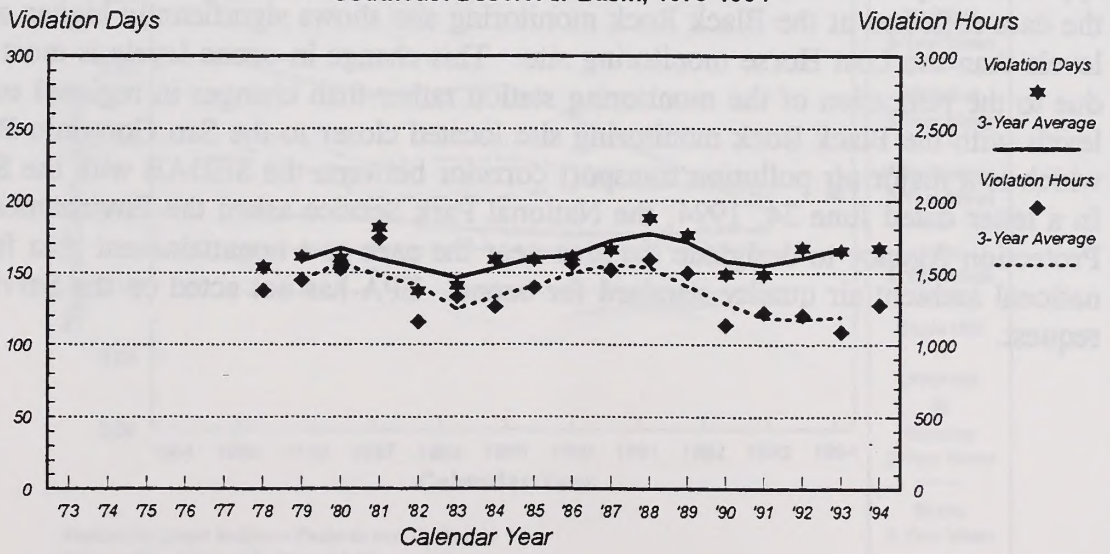
Joshua Tree National Park. As with the SEDAB, ozone is a problematic air contaminant in the Joshua Tree National Park (JTNP) with a significant portion of the ozone and ozone precursors being transported to the JTNP from the SCAB. Table 2-3 shows the California and federal air quality standards for ozone and the maximum levels recorded in the JTNP in the period from 1984 to 1994. Table 2-3 also shows the highest ambient zone concentration measured during monitoring at the Project Site that occurred between April 1990 and March 1991. As shown on these tables, the ambient data collected within the JTNP show violations of the state and federal ozone standard. These violations tend to occur in the evening as late as 11 p.m. when winds are from the southwest, clearly indicating ~~that~~ the strong influence of ozone transport on the exceedances monitored within the JTNP. Figures 2-6 and 2-7 show, respectively, the long-term trend of the maximum one-hour ozone levels and of violations of ozone air quality standards within the JTNP. As shown on Figure 2-6a, the maximum hourly concentrations have declined slightly from 1984 to 1994. The data in Figures 2-6b and 2-7b show that the Joshua Tree data are generally consistent with a pattern of decreasing ozone levels as one moves from west to east across the California desert, reflect the influence of transported air pollution from the South Coast Air Basin.

Figure 2-4
Maximum Hourly Ozone Levels
in Southeast Desert Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-5
Violations of the California
1-Hour Ozone Standard
Southeast Desert Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Table 2-3
Ozone Levels in the Joshua Tree National Park and Project Site

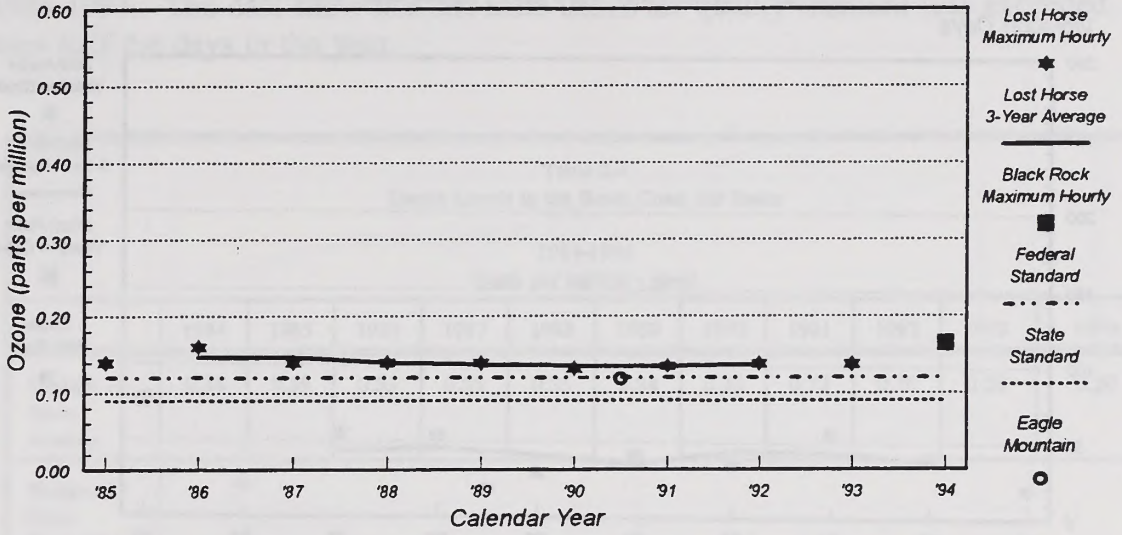
1985-1994
(parts per million - ppm)

	1985	1986	1987	1988	1989	1993	1993	1992	1993	1993
Highest 1-Hour Average										
JTNP - Lost Horse[1]	0.14	0.16	0.14	0.14	0.14	0.13	0.13	0.13	0.14	0.17
JTNP - Black Rock[1]										
Project Site[2]							0.12			
Number of Days Exceeding										
State Standard										
(0.09 ppm, 1-hour)										
JTNP - Lost Horse[1]	19	39	55	36	41	29	53	55	29	77
JTNP - Black Rock[1]										
Project Site[2]							17			
Federal Standard										
(0.12 ppm, 1-hour)										
JTNP - Lost Horse[1]	3	3	0	9	4	1	7	9	1	20
JTNP - Black Rock[1]										
Project Site[2]							0			

Footnotes (Table 2-3):
1. Data source, EPA Aerometric Information Retrieval System (AIRS). For period from 1985 to 1993, data collected at Lost Horse monitoring site. For 1994, data collected at Black Rock monitoring site.
2. From data collected at Project Site between March 1990 and April 1991.

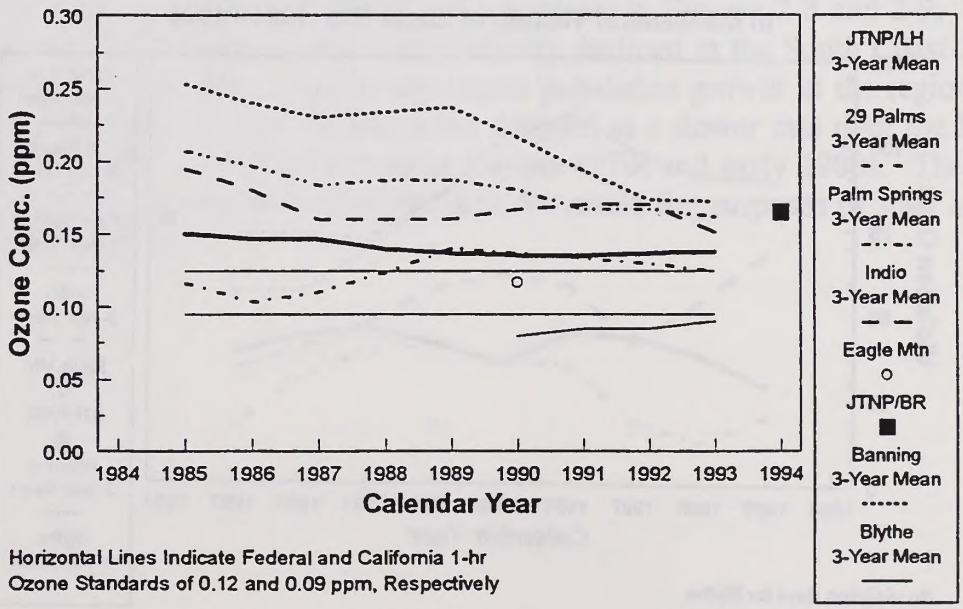
The discontinuity in the ozone data for the JTNP after 1993 is due to relocation of the ozone monitor from the Lost Horse to the Black Rock monitoring site. The Lost Horse monitoring site is located towards the center of Joshua Tree National Park, while the Black Rock monitoring site is towards the northwest corner of the Park, approximately 15 miles northwest of the Lost Horse site. As shown on Figure 2-6, the data collected at the Black Rock monitoring site shows significantly higher ozone levels than the Lost Horse monitoring site. This change in ozone levels is most likely due to the relocation of the monitoring station rather than changes in regional ozone levels with the Black Rock monitoring site located closer to the San Gorgonio Pass which is a major air pollution transport corridor between the SEDAB with the SCAB. In a letter dated June 24, 1994, the National Park Service asked the Environmental Protection Agency to designate the area near the park as a nonattainment area for the national ambient air quality standard for ozone. EPA has not acted on the Service's request.

Figure 2-6A
Maximum Hourly Ozone Levels
in the Joshua Tree National Park and Project Site, 1985-1994



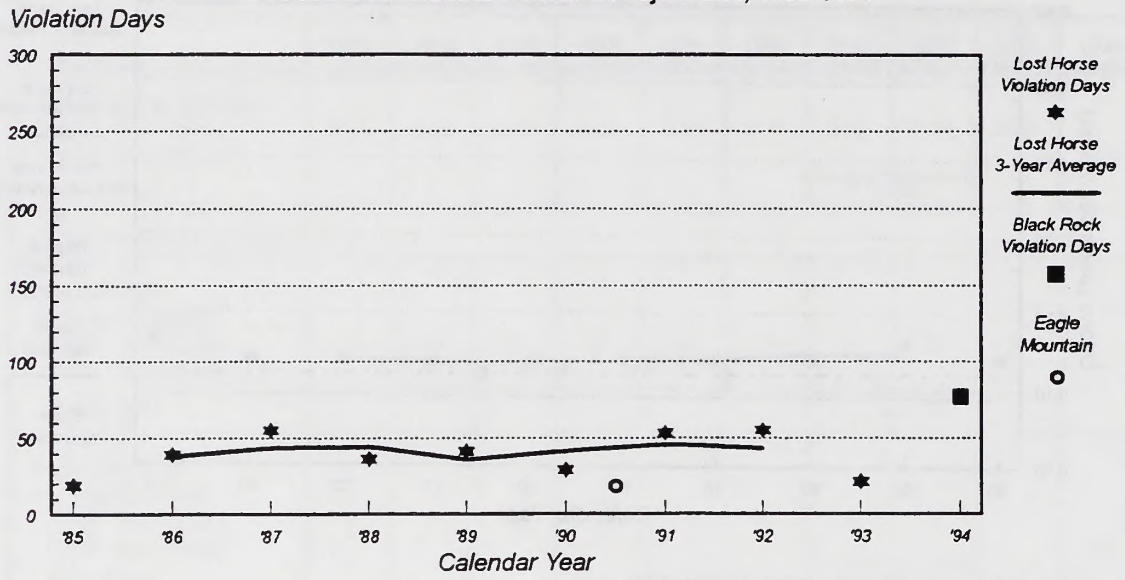
Source: EPA Aerometric Information Retrieval System (AIRS)

Figure 2-6B
Maximum Hourly Ozone Levels 1984 - 1994
Stations in General Vicinity of Eagle Mountain



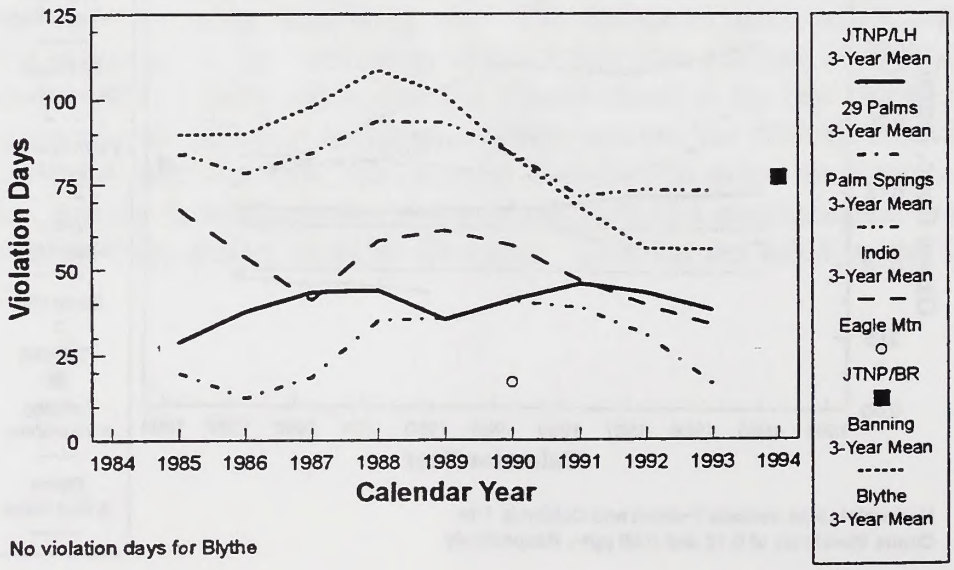
Horizontal Lines Indicate Federal and California 1-hr
Ozone Standards of 0.12 and 0.09 ppm, Respectively

Figure 2-7A
Violations of the California
1-Hour Ozone Standard
Joshua Tree National Park and Project Site, 1985-1994



Source: EPA Aerometric Information Retrieval System (AIRS)

Figure 2-7B
Number of Days that the California 1-hr Ozone Standard was Exceeded for Stations in the General Vicinity of Eagle Mtn 1984 - 1994



No violation days for Blythe

South Coast Air Basin. Maximum ozone concentrations in the SCAB usually are recorded during the summer months. Table 2-4 shows the California and federal air quality standards for ozone, and maximum levels recorded in the SCAB in the period 1984-1994. The data show that the state ozone air quality standard was exceeded over half the days in the year.

Table 2-4
Ozone Levels in the South Coast Air Basin

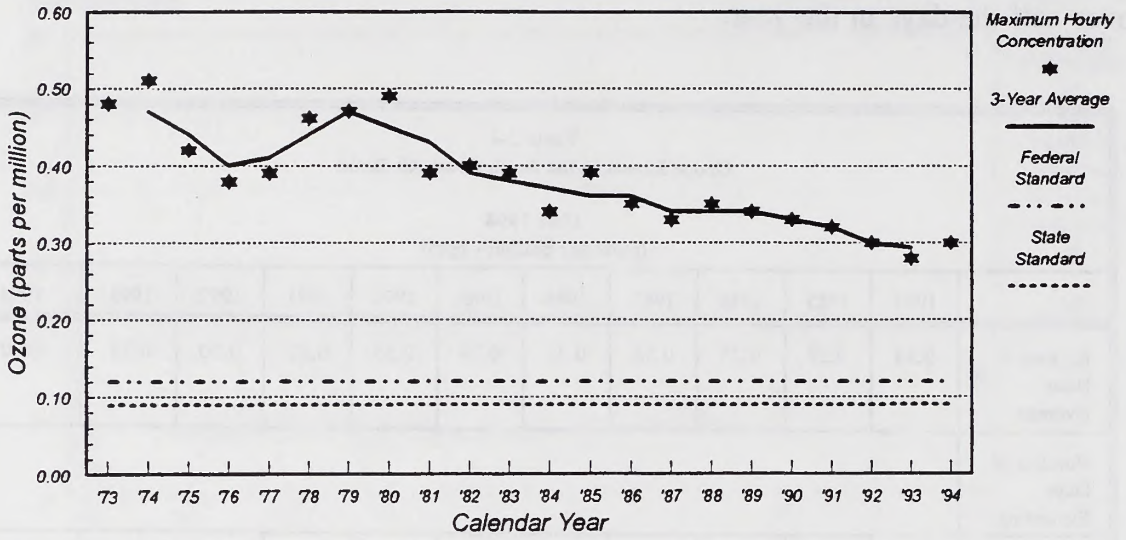
1984-1994
(parts per million - ppm)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Highest 1-Hour Average	0.30	0.33	0.35	0.30	0.35	0.33	0.33	0.32	0.30	0.28	0.30
Number of Days Exceeding											
State Standard (0.09 ppm, 1-hour)	209	211	217	196	216	211	185	183	191	185	165
Federal Standard (0.12 ppm, 1-hour)	175	174	164	162	178	157	132	130	143	124	118

Source: California Air Quality Data, Annual Summary, California Air Resources Board

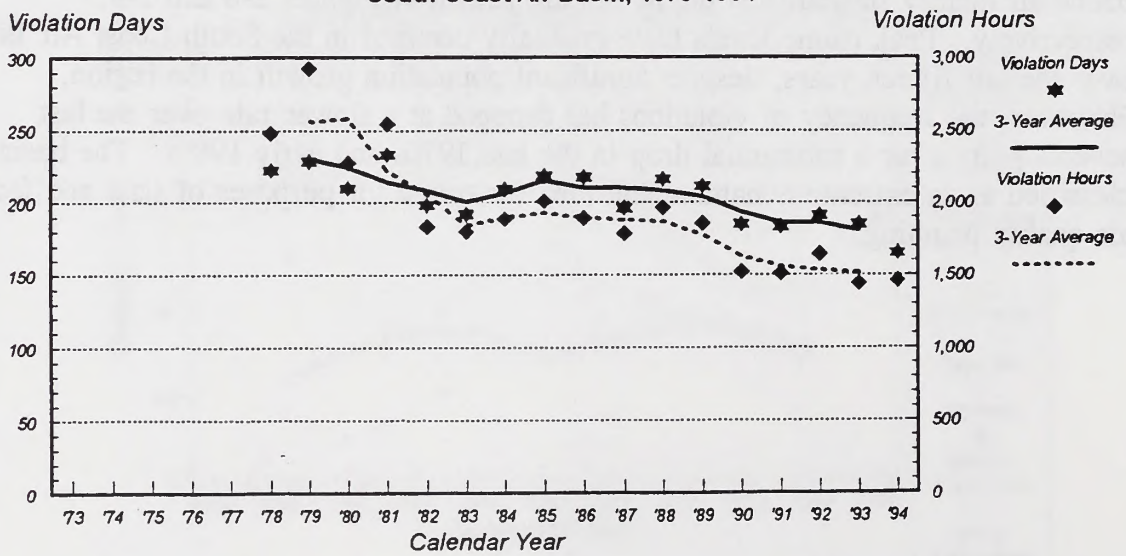
The long-term trends of maximum one-hour ozone readings and of violations of the ozone air quality standards in the SCAB are shown in Figures 2-8 and 2-9, respectively. Peak ozone levels have gradually declined in the South Coast Air Basin over the last fifteen years, despite significant population growth in the region. However, the frequency of violations has dropped at a slower rate over the last several years after a substantial drop in the late 1970s and early 1980s. The basin is classified as an extreme nonattainment area for ozone for purposes of state and federal air quality planning.

Figure 2-8
Maximum Hourly Ozone Levels
in South Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-9
Violations of the California
1-Hour Ozone Standard
South Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

South Central Coast Air Basin. Table 2-5 shows the state and federal air quality standards for ozone and the maximum levels recorded in the basin between 1989 and 1994. This five-year trend indicates a steady decline in both the maximum measured ozone concentrations and the number of days in the year that the basin exceeds the federal and state ozone standard.

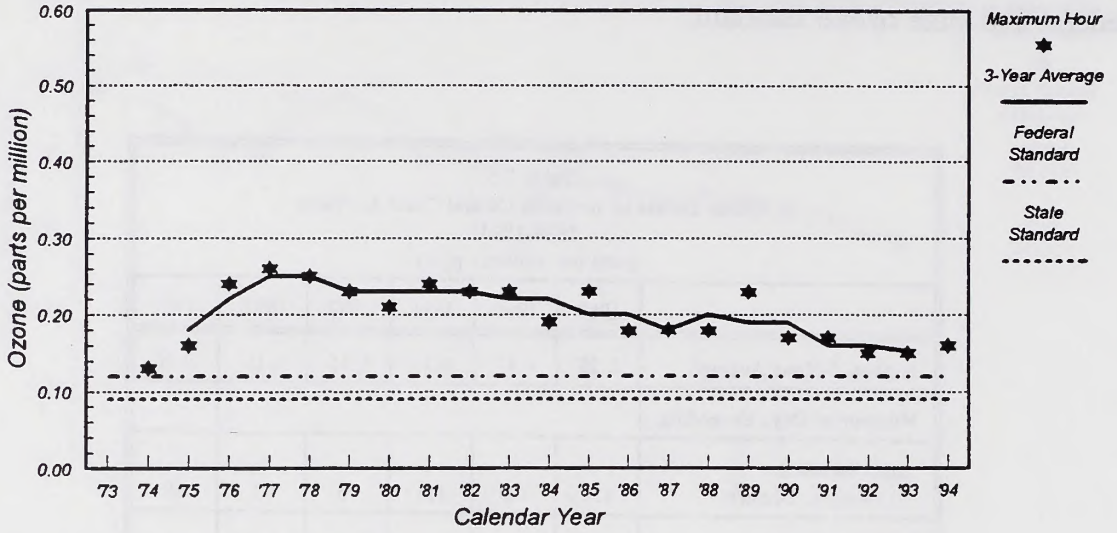
Table 2-5
Ozone Levels in the South Central Coast Air Basin
1989-1994
(parts per million - ppm)

	1989	1990	1991	1992	1993	1994
Highest 1-Hour Average	0.23	0.17	0.17	0.15	0.15	0.16
Number of Days Exceeding						
State Standard (0.09 ppm, 1-hour)	117	117	111	73	63	90
Federal Standard (0.12 ppm, 1-hour)	46	18	35	12	14	17

Source: California Air Quality Data, Annual Summary, California Air Resources Board

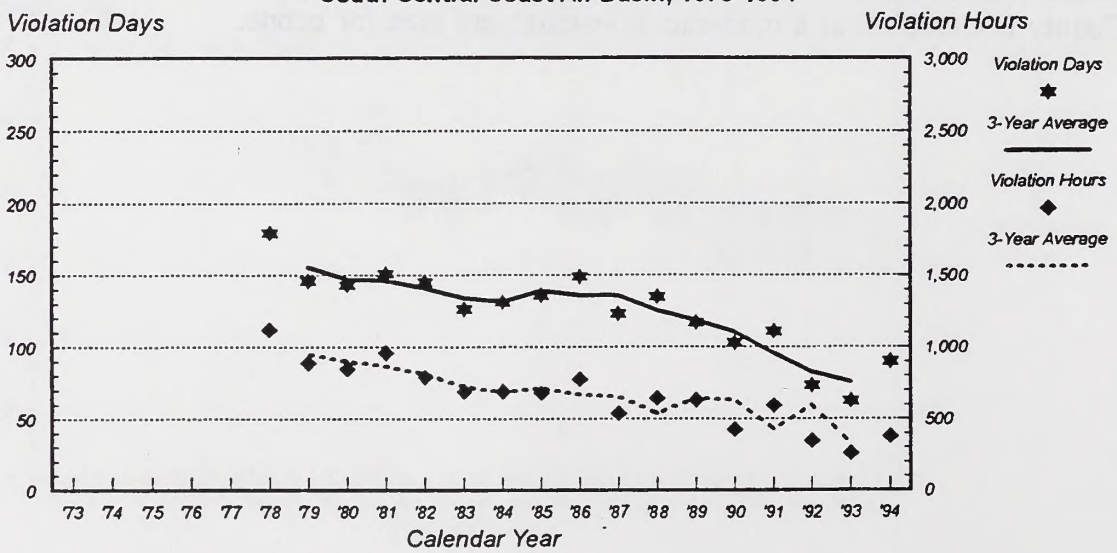
Figures 2-10 and 2-11 show, respectively, the long-term trend of the maximum one-hour ozone concentrations and of violations of ozone air quality standards in the SCCAB. Under the federal standards, the Santa Barbara and Ventura Counties are classified as moderate and severe-15 nonattainment areas for ozone, respectively. All other areas of the basin are unclassified or attainment for ozone. For purposes of state air quality planning, the Santa Barbara and Ventura Counties are classified as serious and severe nonattainment areas for ozone, respectively, while San Luis Obispo County is classified as a moderate nonattainment area for ozone.

Figure 2-10
Maximum Hourly Ozone Levels
in South Central Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-11
Violations of the California
1-Hour Ozone Standard
South Central Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

San Diego Air Basin. Table 2-6 shows the state and federal air quality standards for ozone and the maximum levels recorded in the basin between 1989 and 1994. As seen in the table, ozone levels have generally declined in this six-year period. The data indicate that the number of days that the basin experiences an exceedance of the federal and state ozone standards is declining at a steady pace.

Table 2-6
Ozone Levels in the San Diego Air Basin
1989-1994
(parts per million - ppm)

	1989	1990	1991	1992	1993	1994
Highest 1-Hour Average	0.25	0.20	0.21	0.17	0.19	0.15
Number of Days Exceeding						
State Standard (0.09 ppm, 1-hour)	158	139	106	97	89	79
Federal Standard (0.12 ppm, 1-hour)	55	39	27	19	14	9

Source: California Air Quality Data, Annual Summary, California Air Resources Board

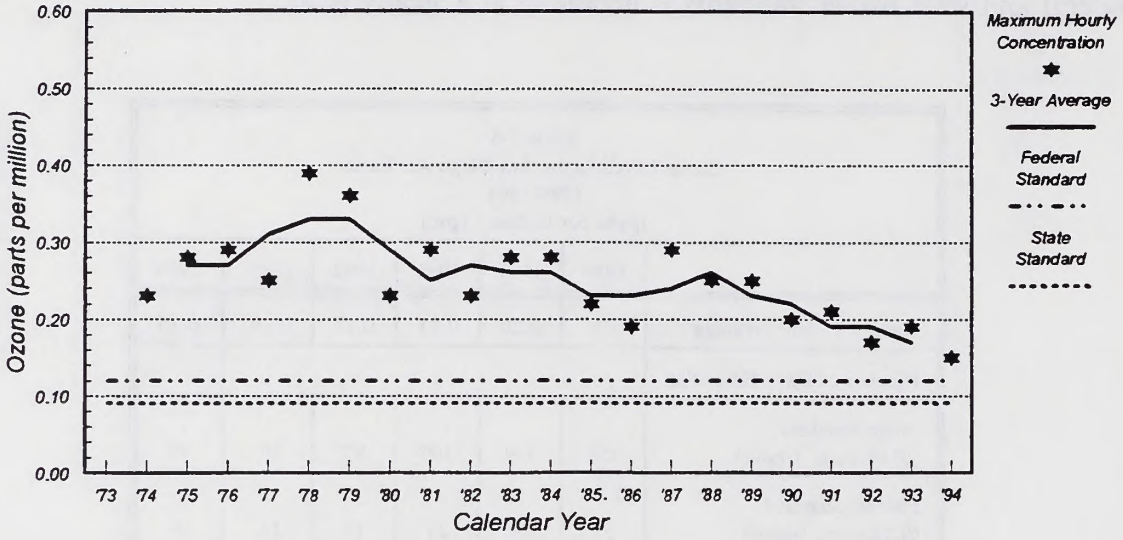
Figures 2-12 and 2-13 show the long-term trend of the maximum one-hour ozone concentrations and of violations of ozone air quality standards in the SDAB. The basin is classified as a severe/severe-15 nonattainment area with respect to state and federal ozone standards.

2.4.2 Nitrogen Dioxide

Nitrogen dioxide (NO_2) is formed primarily in the atmosphere from a reaction between nitric oxide (NO) and oxygen or ozone. Nitric oxide is formed during high-temperature combustion processes when the nitrogen and oxygen in the combustion air combine. Although NO is much less harmful than NO_2, it can be converted to NO_2 in the atmosphere within a matter of hours, or even minutes under certain conditions.

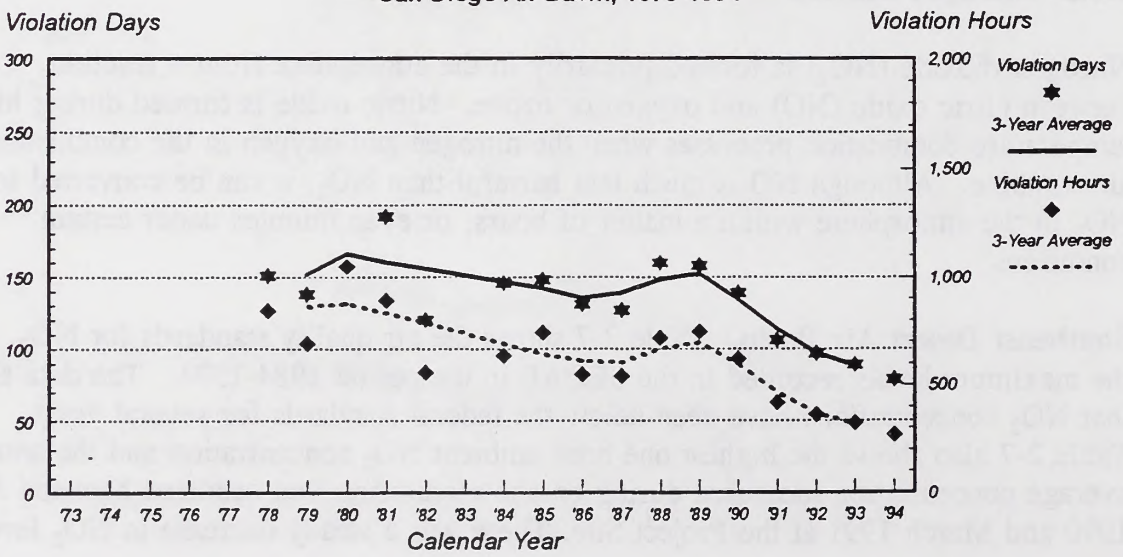
Southeast Desert Air Basin. Table 2-7 shows the air quality standards for NO_2, plus the maximum levels recorded in the SEDAB in the period 1984-1994. The data show that NO_2 concentrations have been below the federal standards for several years. Table 2-7 also shows the highest one-hour ambient NO_2 concentration and the annual average concentration measured during on-site monitoring that occurred between April 1990 and March 1991 at the Project Site. There was a steady decrease in NO_2 levels

Figure 2-12
Maximum Hourly Ozone Levels
San Diego Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-13
Violations of the California
1-Hour Ozone Standard
San Diego Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Table 2-7
Nitrogen Dioxide Levels in the Southeast Desert Air Basin
(Worst Case)

1984-1994
(parts per million - ppm)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Highest 1-Hour Average	0.16	0.14	0.15	0.13	0.11	0.12	0.19	0.25	0.24	0.36	0.23
Highest On-Site 1-Hour Average							0.04[1]				
Annual Average	0.017	0.018	0.015	0.017	0.016	0.019	0.020	0.020	0.015	0.016	0.021
On-Site Annual Average							0.003[2]				
Number of Days Exceeding State Std (0.25 ppm, 1-hr)	0	0	0	0	0	0	0	0	0	1	0
Exceeds the Federal Standard? (0.053 Ann. Avg.)	N	N	N	N	N	N	N	N	N	N	N

Source: California Air Quality Data, Annual Summary, California Air Resources Board
1. Highest NO_2 concentration measured at Eagle Mountain between March 1990 and April 1991.
2. Annual average NO_2 concentration measured at Eagle Mountain between March 1990 and April 1991.

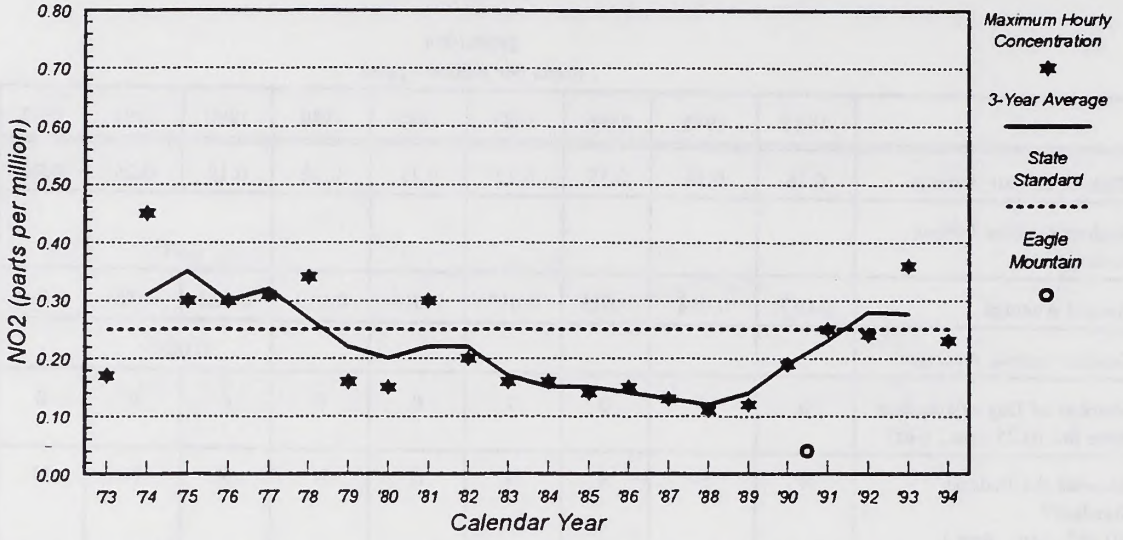
until 1989 when a clear NO_2 increase developed between 1990 and 1993. This increase occurs only at the northern edge of San Bernardino County at Trona, near China Lake. The NO_2 levels at Palm Springs and Twenty Nine Palms, which are west and northwest of the Project Site, are less than one-half of the state NO_2 standard.

Based on the location of Trona, the data suggest that the elevated NO_2 readings may be due to pollutant transport from two routes: 1) the San Joaquin Valley Air Basin through the Tehachapi Pass, and 2) the South Coast Air Basin through the Soledad Canyon and Cajon Pass.

Figure 2-14 shows the trend of maximum one-hour NO_2 levels in the basin. Violation days are plotted in Figure 2-15. A violation of the state NO_2 was recorded in 1993. Under the federal standards, the basin is in unclassified/attainment status. The basin is in attainment for purposes of the California standards.

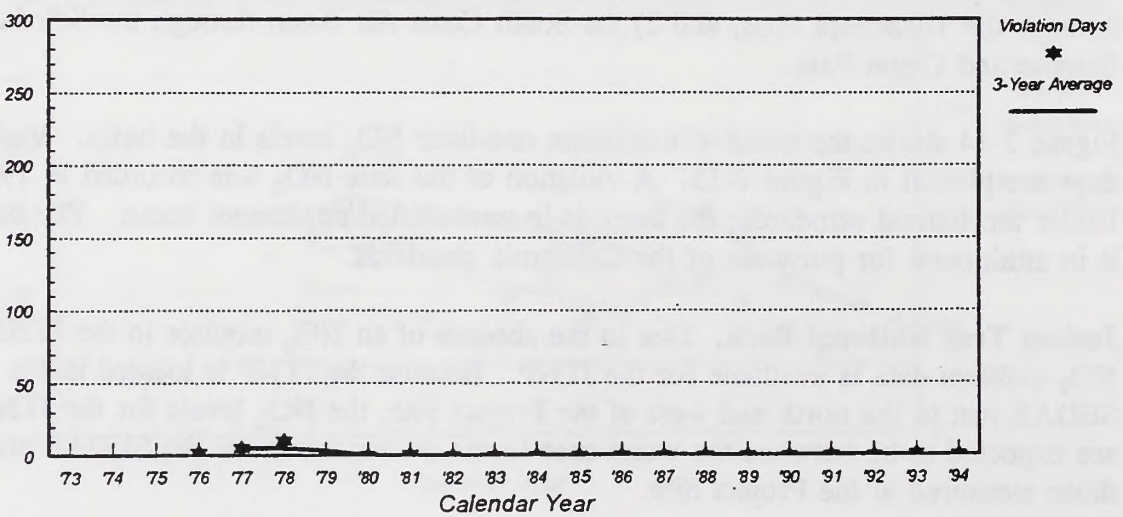
Joshua Tree National Park. Due to the absence of an NO_2 monitor in the JTNP, no NO_2 ambient data is available for the JTNP. Because the JTNP is located in the SEDAB just to the north and west of the Project Site, the NO_2 levels for the JTNP are expected to be between the worst-case levels shown above for the SEDAB and those measured at the Project Site.

Figure 2-14
Maximum Hourly NO2 Levels
in Southeast Desert Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-15
Violations of the California
1-Hour NO2 Standard
Southeast Desert Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

South Coast Air Basin. Table 2-8 shows the state and federal air quality standards for NO_2, plus the maximum levels recorded in the SCAB in the period 1984-1994. Figure 2-16 shows the trend of maximum 1-hour NO_2 levels in the basin, while violation days are plotted in Figure 2-17. The trend indicates a steady decline in peak hour, the number of violations, and annual average concentrations over the last 10-15 years. The basin is a nonattainment area for NO_2 for purposes of state and federal air quality planning.*

Table 2-8
Nitrogen Dioxide Levels in the South Coast Air Basin

1984-1994
(parts per million - ppm)

	1984	1984	1984	1987	1988	1984	1990	1991	1992	1993	1994
Highest 1-Hour Average	0.35	0.35	0.34	0.42	0.54	0.34	0.28	0.35	0.19	0.26	0.25
Annual Average	0.057	0.061	0.061	0.055	0.061	0.043	0.039	0.041	0.023	0.036	0.039
Number of Days Exceeding State Standard (0.25 ppm, 1-hour)	12	9	8	7	11	8	6	9	0.00	1	0
Exceeds the Federal Standard? (0.053 Ann. Avg.)	Y	Y	Y	Y	Y	N	N	N	N	N	N

Source: California Air Quality Data, Annual Summary, California Air Resources Board.

South Central Coast Air Basin. Table 2-9 shows the air quality standards for NO_2, plus the maximum levels recorded in the SCCAB between 1989 and 1994. The data show that NO_2 concentrations have been below the state and federal standards since 1979. Under the federal standards, the basin is in unclassified/attainment status. The basin is in attainment for purposes of the California standards. Figure 2-18 shows the trend of maximum one-hour NO_2 levels in the basin. Violations of the California standard are shown in Figure 2-19.

* Although the SCAB met the federal annual average NO_2 standard in 1992 through 1994, EPA has not formally changed the area's designation.

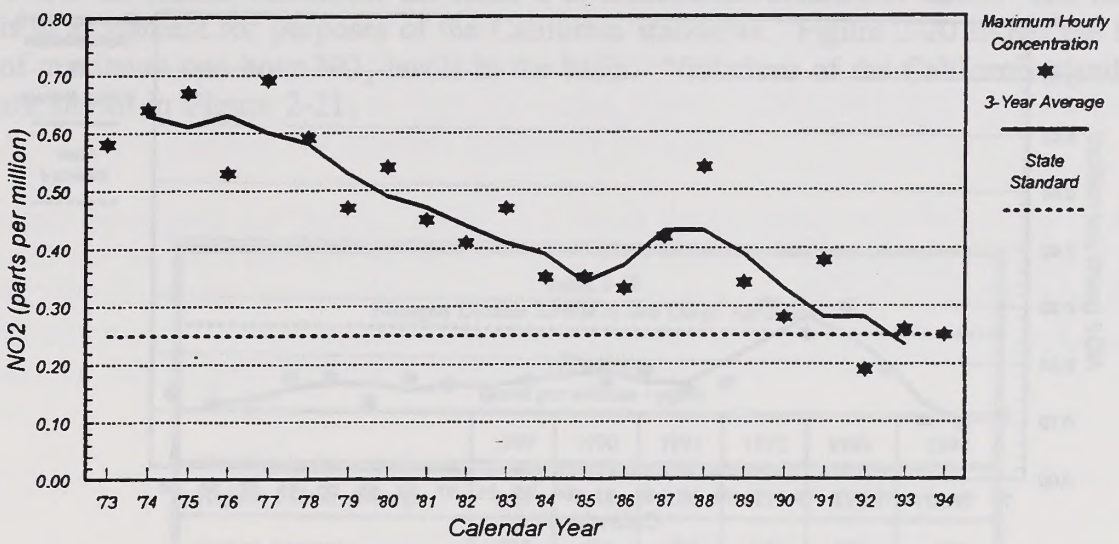
Table 2-9
Nitrogen Dioxide Levels in the South Central Coast Air Basin

1989-1994
(parts per million - ppm)

	1989	1990	1991	1992	1993	1994
Highest 1-Hour Average	0.12	0.16	0.16	0.10	0.11	0.13
Annual Average	.012	0.01	0.01	0.009	0.009	0.008
Number of Days Exceeding State Standard (0.25 ppm, 1-hour)	0	0	0	0	0	0
Exceed Federal Standard? (0.053 ppm, annual avg)	N	N	N	N	N	N

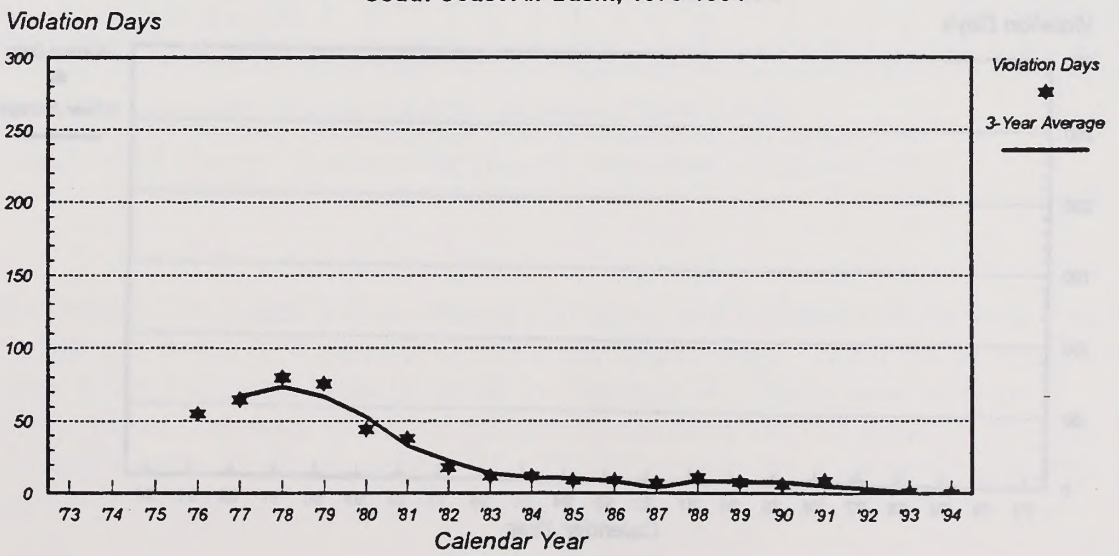
Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-16
Maximum Hourly NO2 Levels
in South Coast Air Basin, 1973-1994



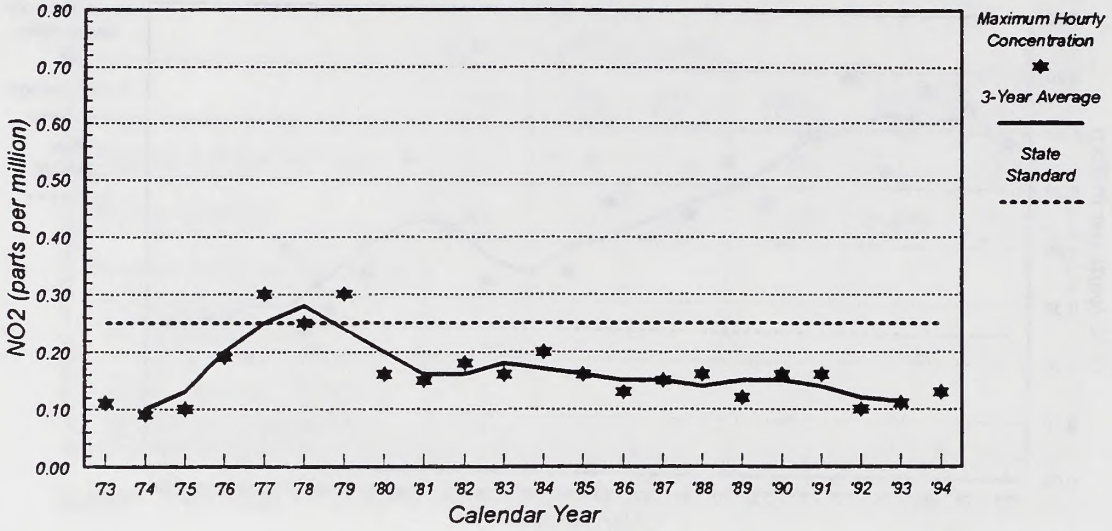
Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-17
Violations of the California
1-Hour NO2 Standard
South Coast Air Basin, 1973-1994



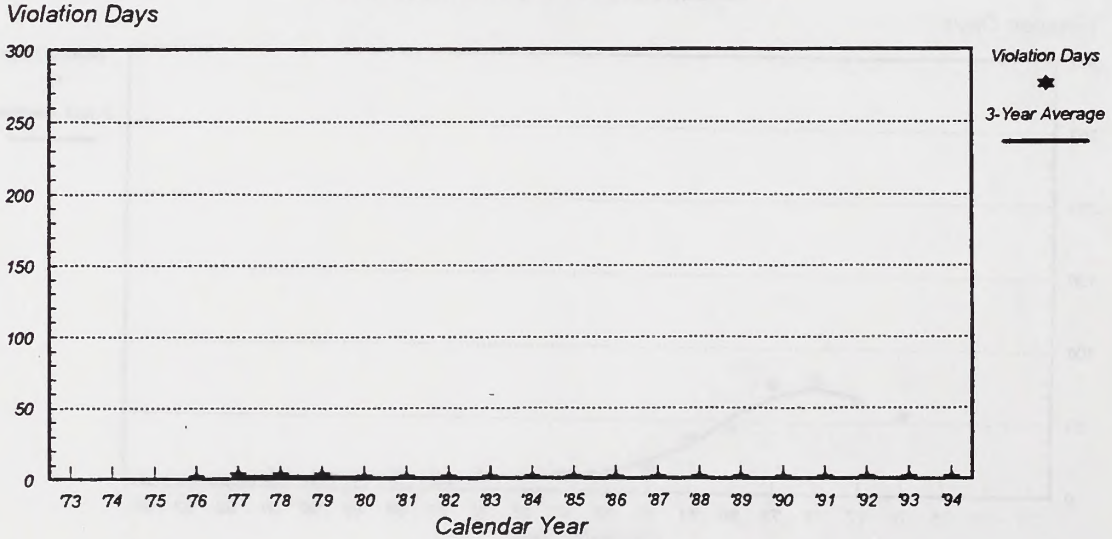
Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-18
Maximum Hourly NO2 Levels
in South Central Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-19
Violations of the California
1-Hour NO2 Standard
South Central Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

San Diego Air Basin. Table 2-10 shows the air quality standards for NO_2, plus the maximum levels recorded in the SDAB between 1989 and 1994. The data show that NO_2 concentrations have been below the state and federal standards for several years. Under the federal standards, the basin is in unclassified/attainment status. The basin is in attainment for purposes of the California standards. Figure 2-20 shows the trend of maximum one-hour NO_2 levels in the basin. Violations of the California standard are shown in Figure 2-21.

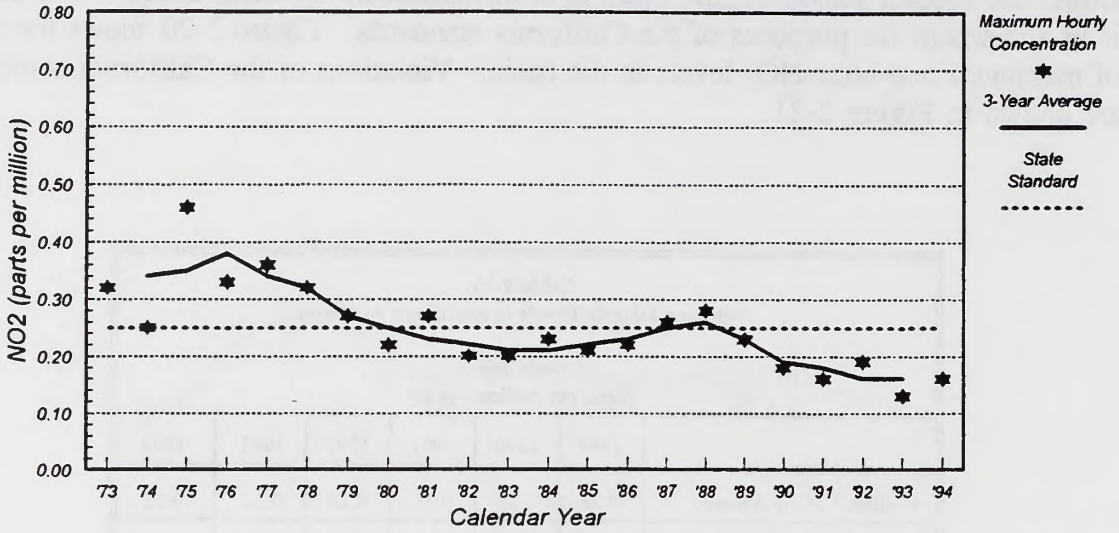
Table 2-10
Nitrogen Dioxide Levels in San Diego Air Basin

1989-1994
(parts per million - ppm)

	1989	1990	1991	1992	1993	1994
Highest 1-Hour Average	0.23	0.16	0.16	0.19	0.13	0.16
Annual Average	.028	.025	.025	.023	.021	.022
Number of Days Exceeding						
State Standard (0.25 ppm, 1-hour)	0	0	0	0	0	0
Exceed Federal Standard? (0.053 ppm, annual avg)	N	N	N	N	N	N

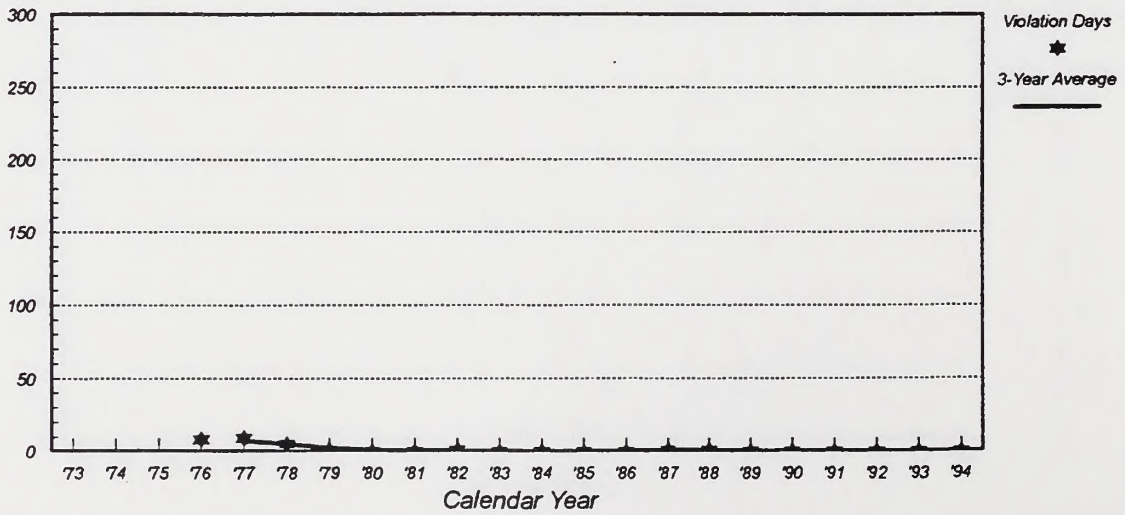
Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-20
Maximum Hourly NO2 Levels
San Diego Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-21
Violations of the California
1-Hour NO2 Standard
San Diego Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

2.4.3 Carbon Monoxide

Carbon monoxide is a product of inefficient combustion, principally from automobiles and other mobile sources of pollution. In many areas in California, CO emissions from wood-burning stoves and fireplaces can also be measurable contributors. Industrial sources of pollution typically contribute less than 10 percent of ambient CO levels. Peak CO levels occur typically during winter months, due to a combination of higher emission rates and stagnant weather conditions.

Southeast Desert Air Basin. Table 2-11 shows the California and federal air quality standards for CO, and the maximum 1-hour and 8-hour average levels recorded in the SEDAB during the period 1984-1994. Table 2-11 also shows the highest 1-hour and 8-hour ambient CO concentrations measured during on-site monitoring that occurred between March 1990 and April 1991 at the Project Site.

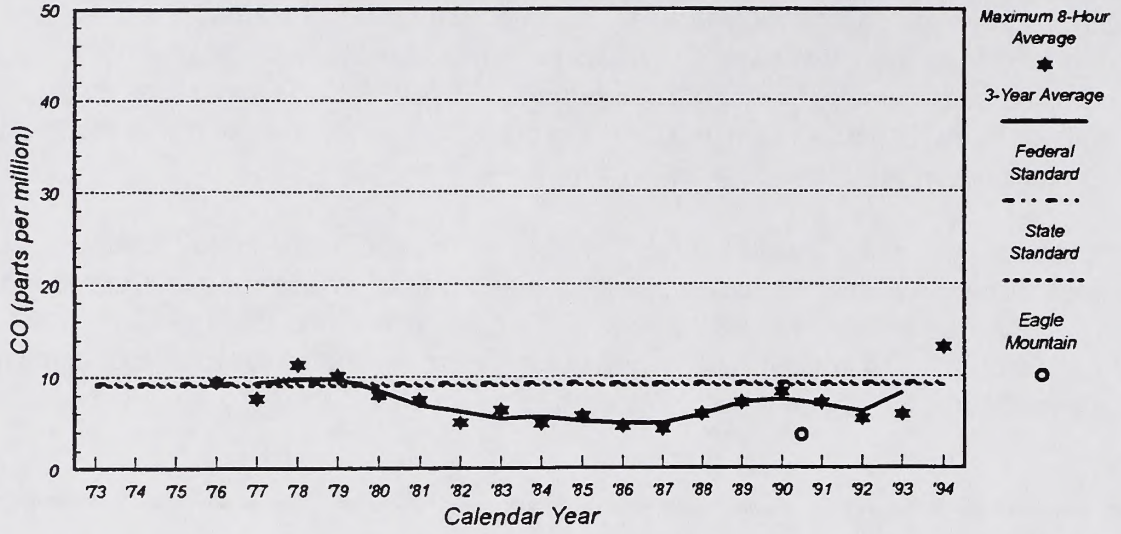
Table 2-11
Carbon Monoxide Levels in the Southeast Desert Air Basin
(Worst Case)
1984-1994
(parts per million - ppm)

	1983	1983	1986	1983	1988	1986	1990	1991	1992	1993	1994
Highest 8-Hour Average	4.9	5.9	4.6	4.4	5.9	7.1	8.3	7.1	5.4	5.9	13.1
Highest On-Site 8-Hour Average							3.7[1]				
Highest 1-Hour Average	10	12	9	12	13	10	11	10	9	8	31
Highest On-Site 1-Hour Average							8.9[2]				
Number of Days Exceeding											
State Standard (20 ppm, 1-hr)	0	0	0	0	0	0	0	0	0	0	4
State Standard (9.0 ppm, 8-hr)	0	0	0	0	0	0	0	0	0	0	10
Federal Standard (35 ppm, 1-hr)	0	0	0	0	0	0	0	0	0	0	0
Federal Standard (9 ppm, 8-hr)	0	0	0	0	0	0	0	0	0	0	9

Source: California Air Quality Data, Annual Summary, California Air Resources Board
1. Highest 8-hour CO concentration measured at Eagle Mountain between March 1990 and April 1991.
2. Highest 1-hour CO concentration measured at Eagle Mountain between March 1990 and April 1991.

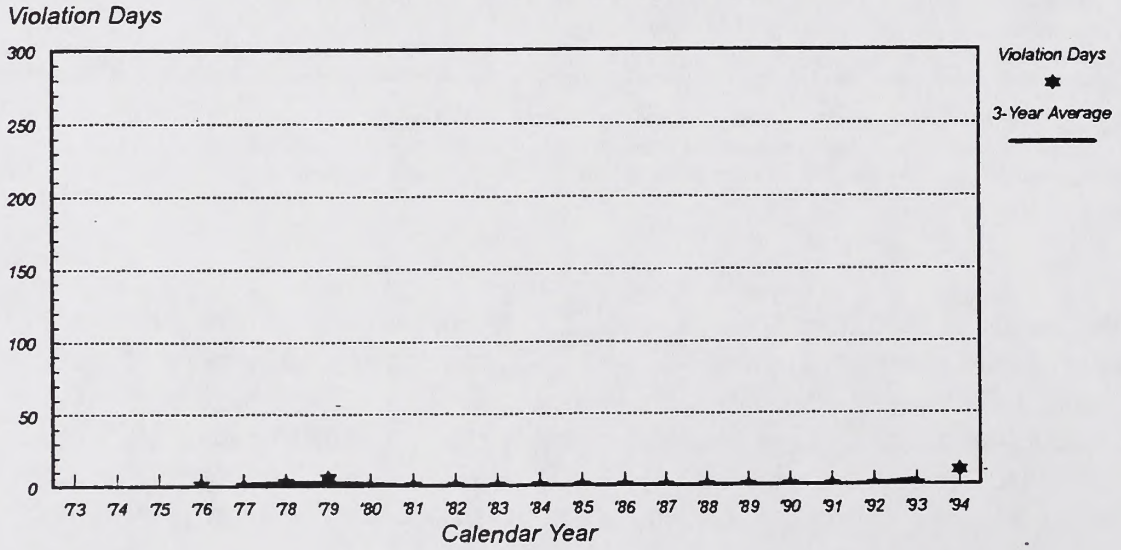
The trends of maximum 8-hour average CO levels and violations of the state 8-hour standard are shown in Figures 2-22 and 2-23, respectively. The trend of maximum 1-hour CO levels in the basin is shown in Figure 2-24. There have been no exceedances of any state or federal air quality standards for CO since 1979 in the Southeast Desert Air Basin, until 1994. The 1994 exceedances were all recorded at a new monitoring station in Calexico, which began operating in June 1994. The

Figure 2-22
Maximum 8-Hour Average CO Levels
In Southeast Desert Air Basin, 1973-1994



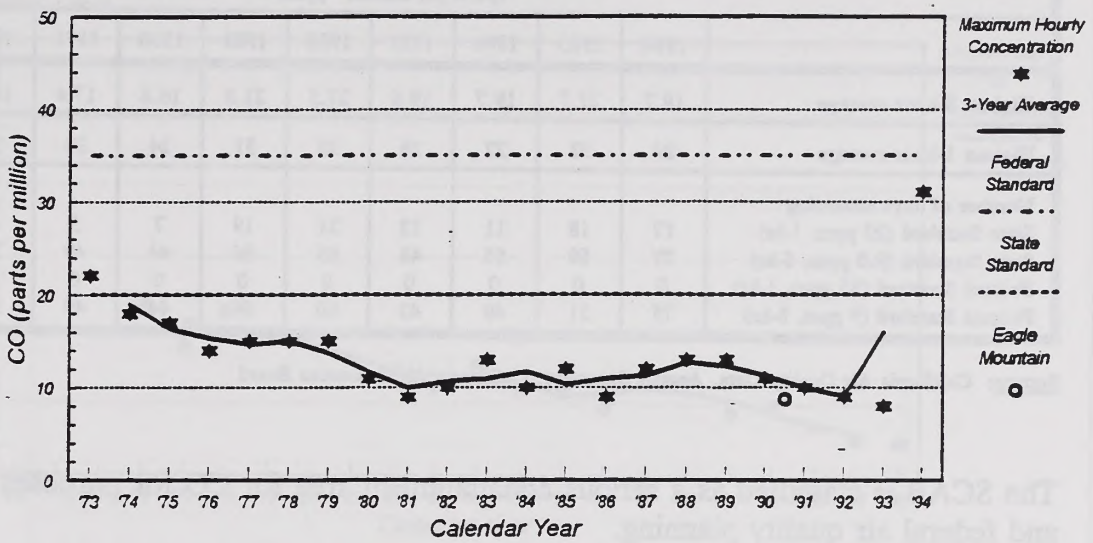
Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-23
Violations of the California
8-Hour CO Standard
Southeast Desert Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-24
Maximum Hourly CO Levels
in Southeast Desert Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

basin is considered an attainment area for CO for purpose of state and federal air quality planning.

Joshua Tree National Park. Due to the absence of a CO monitor in the JTNP, no CO ambient data are available for the JTNP. Because the JTNP is located in the SEDAB just to the north and west of the Project Site, the CO levels for the JTNP are expected to be between the worst-case levels shown above for the SEDAB and those measured at the Project Site.

South Coast Air Basin. Table 2-12 shows the California and federal air quality standards for CO, and the maximum 1-hour and 8-hour average levels recorded in the SCAB during the period 1984-1994. Maximum 8-hour CO levels in the basin are roughly two to three times the state and federal standards. The federal 1-hour standard is being met, but not the more stringent state standard.

The trends of maximum 8-hour average CO levels and violations of the state 8-hour standard are shown in Figures 2-25 and 2-26, respectively. The trend of maximum hourly CO levels in the basin is shown in Figure 2-27. The data show that while CO levels have decreased over the last 20 years, the trends have slowed over the last five to ten years.

Table 2-12
Carbon Monoxide Levels in the South Coast Air Basin

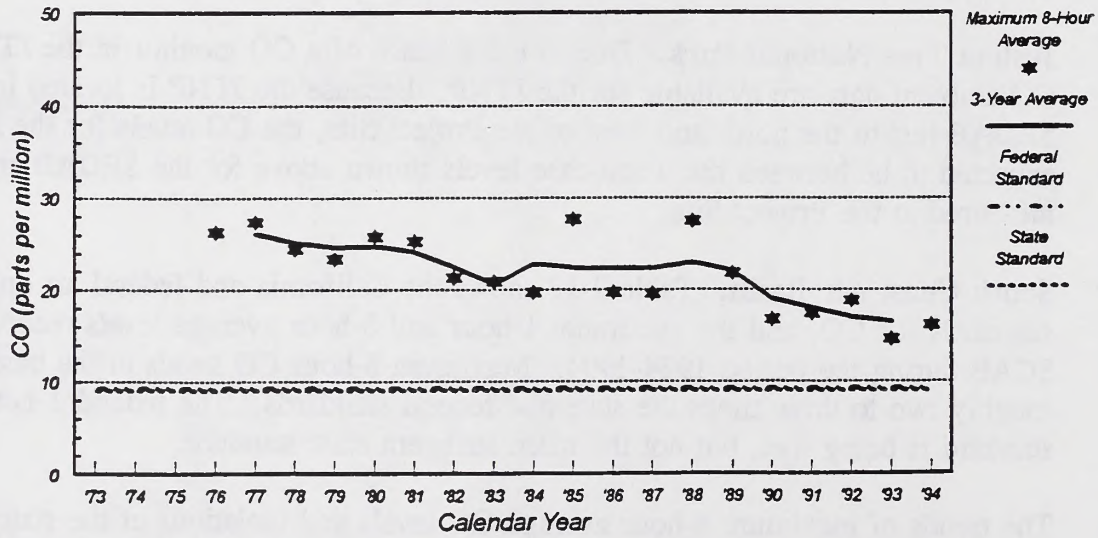
1984-1994
(parts per million - ppm)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Highest 8-hour average	19.7	27.7	19.7	19.6	27.5	21.8	16.8	17.4	18.8	14.6	16.1
Highest 1-hour average	29	33	27	26	32	31	24	30	28	21	25
Number of days exceeding											
State Standard (20 ppm, 1-hr)	17	18	11	12	21	19	7	5	6	1	1
State Standard (9.0 ppm, 8-hr)	77	59	58	48	65	66	44	49	36	26	24
Federal Standard (35 ppm, 1-hr)	0	0	0	0	0	0	0	0	0	0	0
Federal Standard (9 ppm, 8-hr)	75	51	49	43	60	66	44	49	36	26	22

Source: California Air Quality Data, Annual Summary, California Air Resources Board

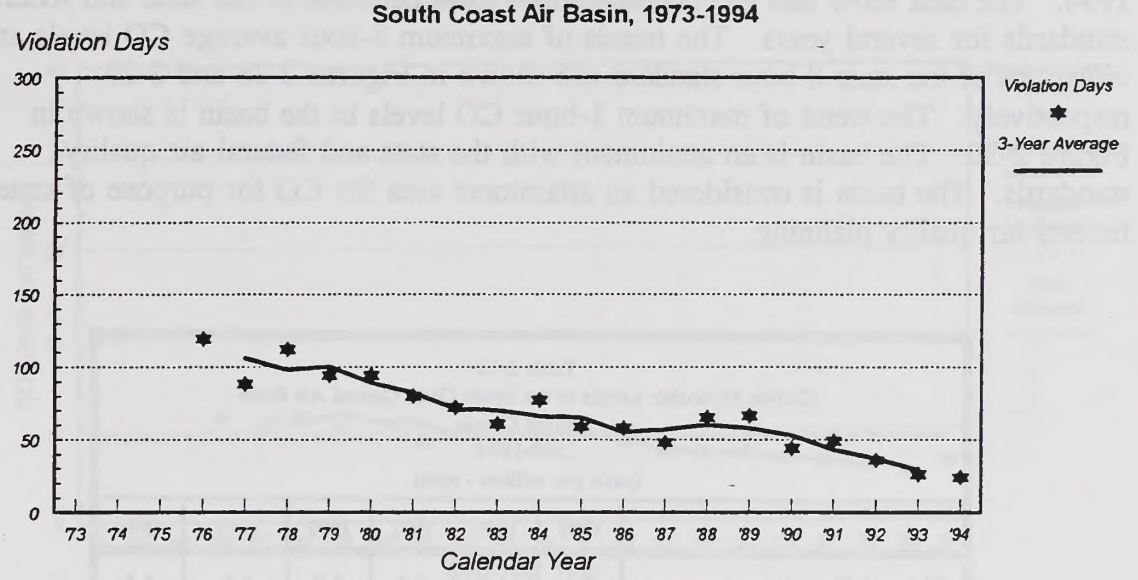
The SCAB is classified as a serious nonattainment area for CO for purposes of state and federal air quality planning.

Figure 2-25
Maximum 8-Hour Average CO Levels
in South Coast Air Basin, 1973-1994



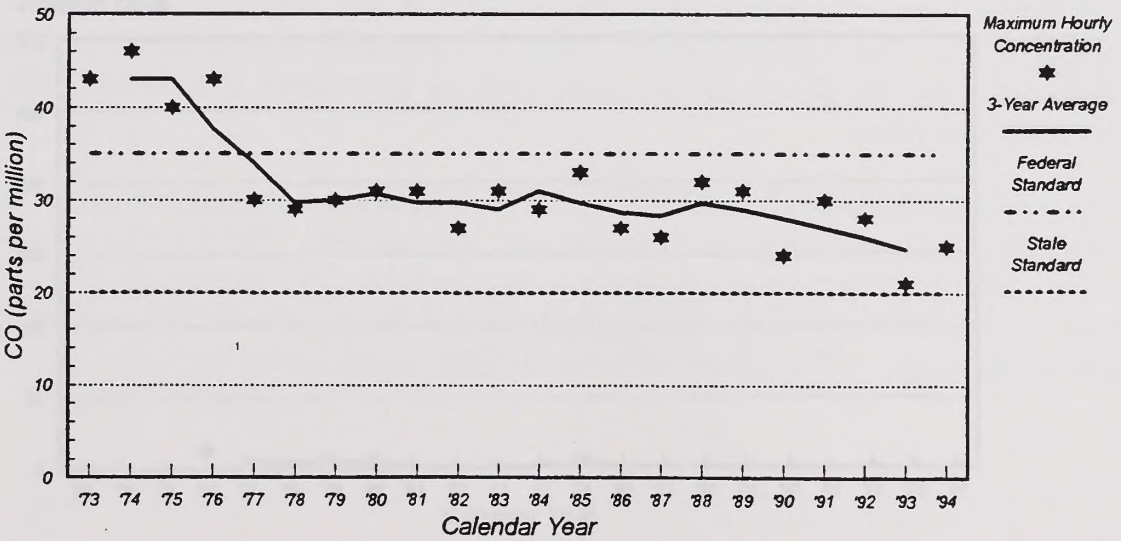
Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-26
Violations of the California
8-Hour CO Standard
South Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-27
Maximum Hourly CO Levels
in South Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

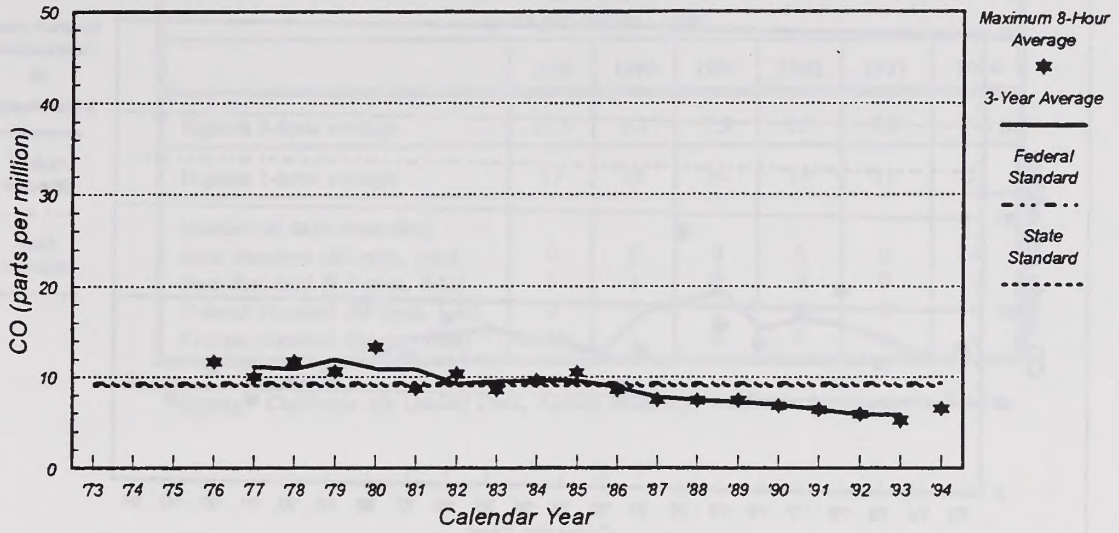
South Central Coast Air Basin. Table 2-13 shows the air quality standards for CO, plus the maximum levels recorded in the SCCAB in the period between 1989 and 1994. The data show that CO concentrations have been below the state and federal standards for several years. The trends of maximum 8-hour average CO levels and violations of the state 8-hour standard are shown in Figures 2-28 and 2-29, respectively. The trend of maximum 1-hour CO levels in the basin is shown in Figure 2-30. The basin is an attainment with the state and federal air quality standards. The basin is considered an attainment area for CO for purpose of state and federal air quality planning.

Table 2-13
Carbon Monoxide Levels in the South Coast Central Air Basin
(Worst Case)
1989-1994
(parts per million - ppm)

	1989	1990	1991	1992	1993	1994
Highest 8-Hour Average	7.4	6.8	6.4	5.9	5.2	6.5
Highest 1-Hour Average	11	11	9	12	9	11
Number of Days Exceeding						
State Standard (20 ppm, 1-hr)	0	0	0	0	0	0
State Standard (9.0 ppm, 8-hr)	0	0	0	0	0	0
Federal Standard (35 ppm, 1-hr)	0	0	0	0	0	0
Federal Standard (9 ppm, 8-hr)	0	0	0	0	0	0

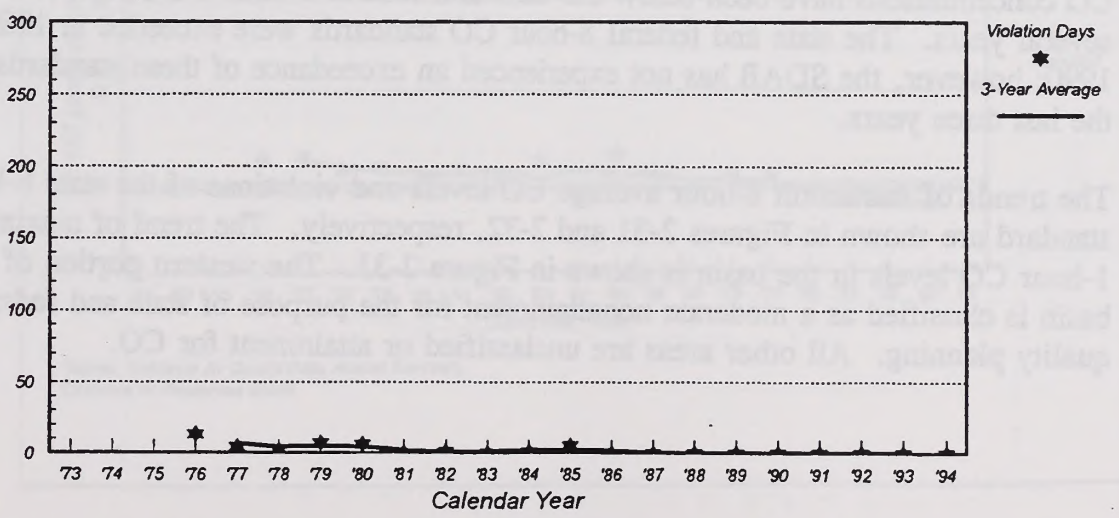
Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-28
Maximum 8-Hour Average CO Levels
in South Central Coast Air Basin, 1973-1994



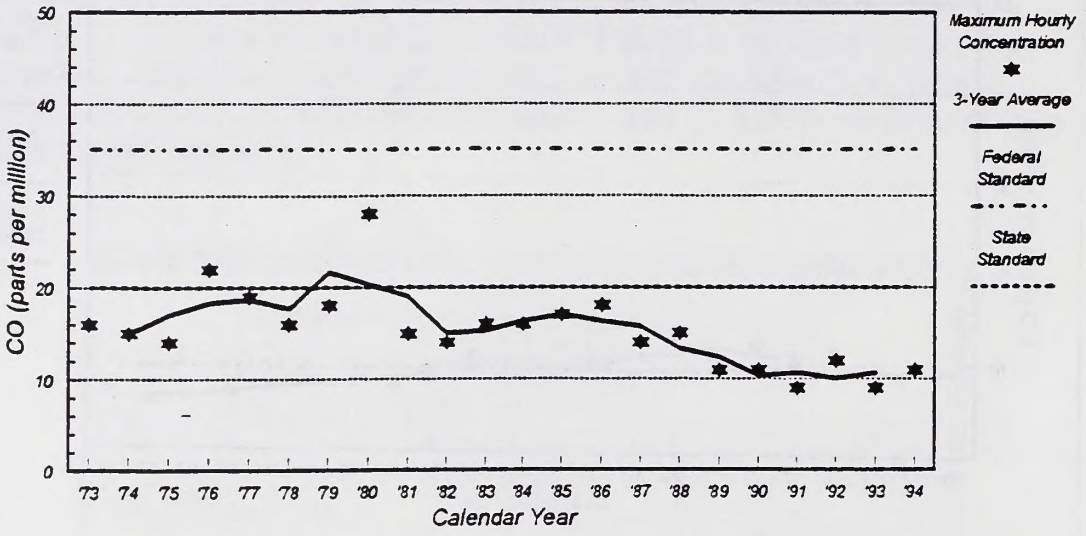
Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-29
Violations of the California
8-Hour CO Standard
South Central Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-30
Maximum Hourly CO Levels
in South Central Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

San Diego Air Basin. Table 2-14 shows the air quality standards for CO, plus the maximum levels recorded in the SDAB between 1989 and 1994. The data show that CO concentrations have been below the state and federal 1-hour CO standards for several years. The state and federal 8-hour CO standards were exceeded in 1989 and 1990; however, the SDAB has not experienced an exceedance of these standards in the last three years.

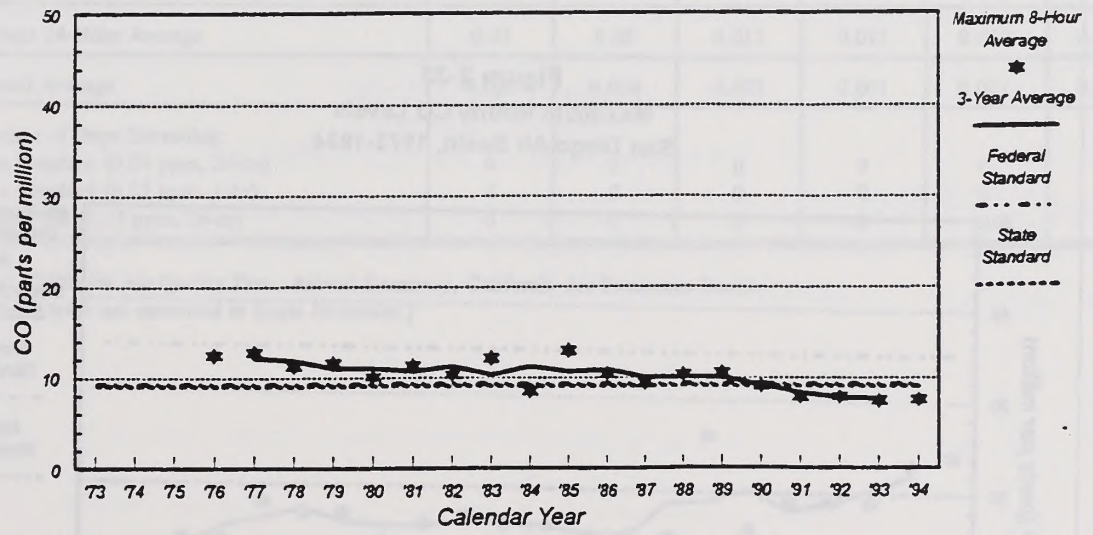
The trends of maximum 8-hour average CO levels and violations of the state 8-hour standard are shown in Figures 2-31 and 2-32, respectively. The trend of maximum 1-hour CO levels in the basin is shown in Figure 2-33. The western portion of the basin is classified as a moderate nonattainment for the purpose of state and federal air quality planning. All other areas are unclassified or attainment for CO.

Table 2-14
Carbon Monoxide Levels in the San Diego Air Basin
(Worst Case)
1989-1994
(parts per million - ppm)

	1989	1990	1991	1992	1993	1994
Highest 8-hour average	10.5	9.1	7.9	7.9	7.5	7.6
Highest 1-hour average	17	18	14	14	11	11
Number of days exceeding						
State Standard (20 ppm, 1-hr)	0	0	0	0	0	0
State Standard (9.0 ppm, 8-hr)	6	1	0	0	0	0
Federal Standard (35 ppm, 1-hr)	0	0	0	0	0	0
Federal Standard (9 ppm, 8-hr)	6	1	0	0	0	0

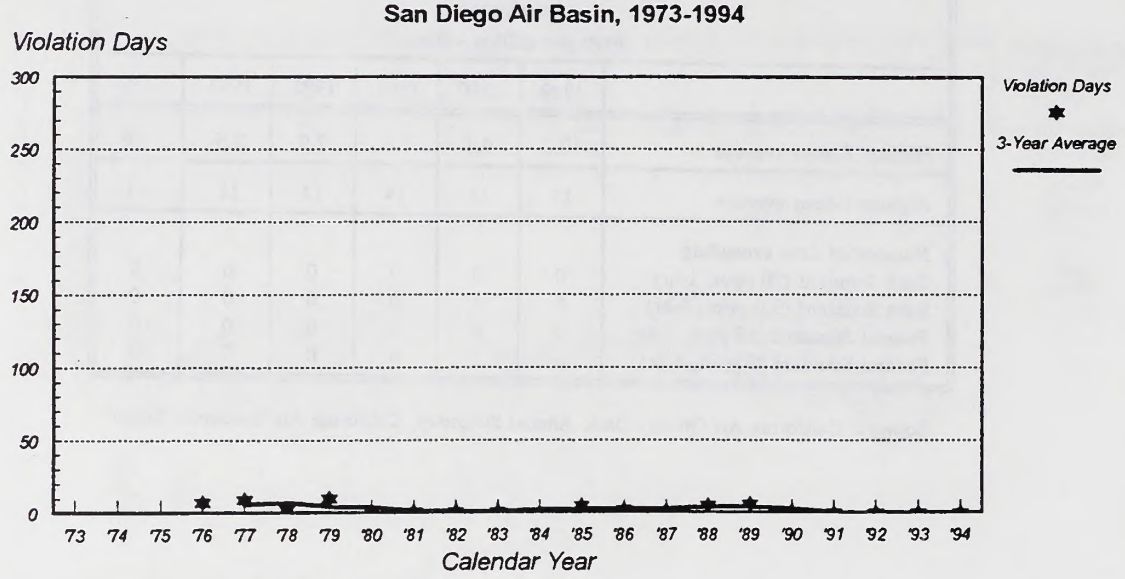
Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-31
Maximum 8-Hour Average CO Levels
San Diego Air Basin, 1973-1994



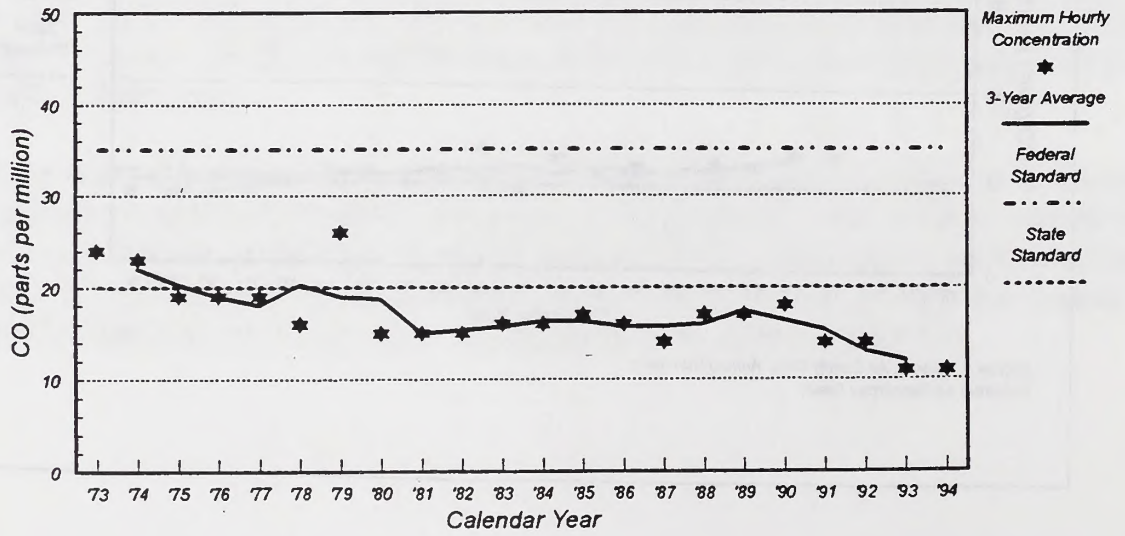
Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-32
Violations of the California
8-Hour CO Standard
San Diego Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-33
Maximum Hourly CO Levels
San Diego Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

2.4.4 Sulfur Dioxide

Sulfur dioxide (SO_2) is produced when any sulfur-containing fuel is burned. It is also emitted by chemical plants that treat or refine sulfur or sulfur-containing chemicals. Because of the complexity of the chemical reactions that convert SO_2 to other compounds (such as sulfates), peak concentrations of SO_2 occur at different times of the year in different parts of the state, depending on local fuel characteristics, weather, and topography.

Southeast Desert Air Basin. Table 2-15 shows the California and federal air quality standards for SO_2, and the maximum levels recorded in the Southeast Desert Air Basin during the period 1989-1994. As shown in Figures 2-34 and 2-35, SO_2 levels in the SEDAB have been well within air quality standards since 1978. The most recent violation of the more-stringent state standard was in 1990. The basin is considered to be in attainment of the state and federal SO_2 standards.

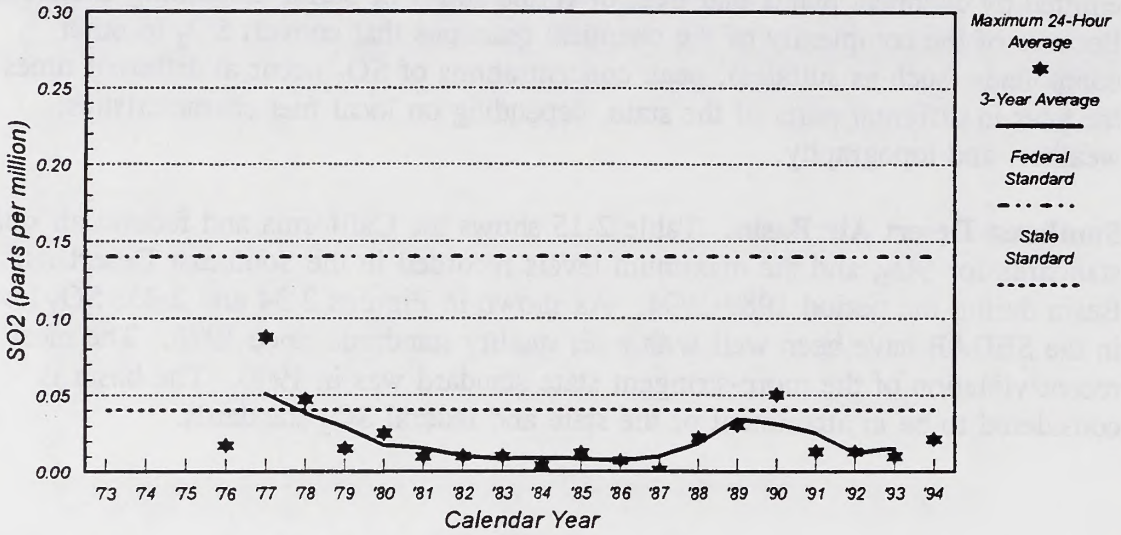
Table 2-15
Sulfur Dioxide Levels in the Southeast Desert Air Basin

1989-1994
(parts per million - ppm)

	1989	1990	1991	1992	1993	1994
Highest 1-Hour	0.03	0.05	0.03	0.03	0.03	0.07
Highest 24-Hour Average	0.03	0.05	0.013	0.013	0.010	0.021
Annual Average	0.002	0.004	0.003	0.001	0.001	0.001
Number of Days Exceeding						
State Standard (0.04 ppm, 24-hr)	0	1	0	0	0	0
State Standard (0.25 ppm, 1-hr)	0	0	0	0	0	0
Federal Std (0.14 ppm, 24-hr)	0	0	0	0	0	0

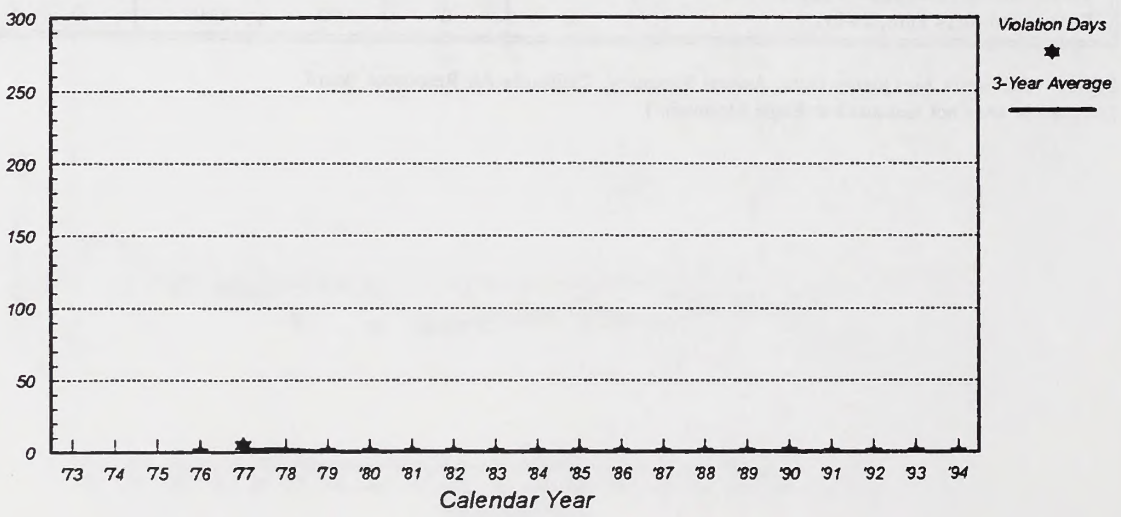
Source: California Air Quality Data, Annual Summary, California Air Resources Board
[SO_2 levels were not measured at Eagle Mountain.]

Figure 2-34
Maximum 24-Hour Average SO2 Levels
in Southeast Desert Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-35
Violations of the California
24-Hour SO2 Standard
Southeast Desert Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Joshua Tree National Park. Due to the absence of a SO_2 monitor in the JTNP, no SO_2 ambient data are available for the JTNP. Because the JTNP is located in the SEDAB, the SO_2 levels for the JTNP are expected to be at or below the worst-case levels shown above for the SEDAB.

South Coast Air Basin. Table 2-16 shows the California and federal air quality standards for SO_2, and the maximum levels recorded in the South Coast Air Basin during the period 1989-1994. The 1990 maximum 24-hour average was slightly above the California standard; no exceedances of state or federal SO_2 standards have been observed since that time.

Table 2-16
Sulfur Dioxide Levels in the South Coast Air Basin

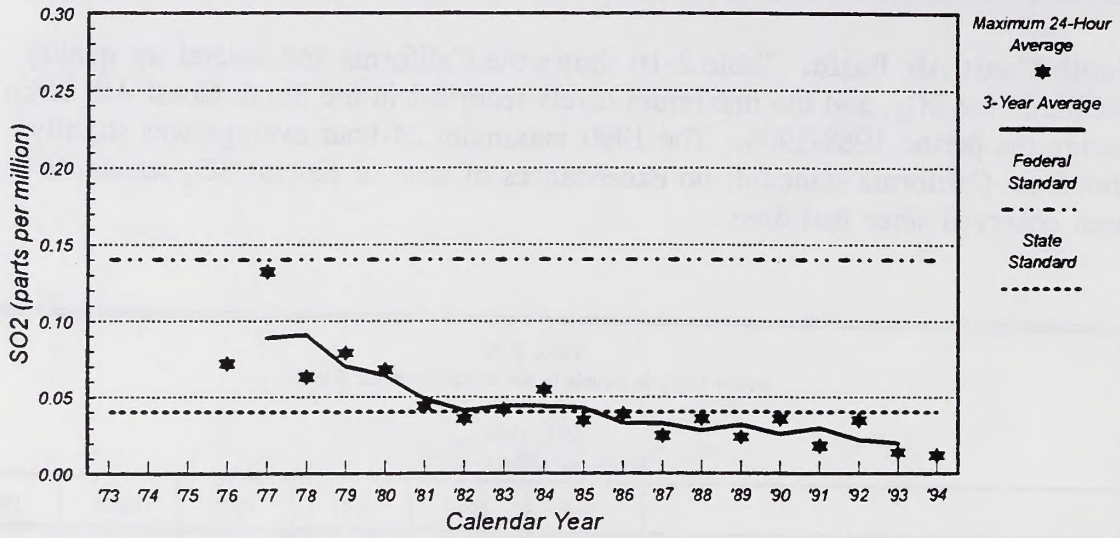
1989-1994
(parts per million - ppm)

	1989	1990	1991	1992	1993	1994
Highest 1-Hour	0.14	0.31	0.14	0.15	0.08	0.04
Highest 24-Hour Average	.024	.035	.018	.035	.014	0.012
Annual Average	.002	.002	.003	.002	.001	.001
Number of Days Exceeding						
State Stadnard (0.04 ppm, 24-hr)	0	0	0	0	0	0
State Standard (0.25 ppm, 1-hr)	0	0	0	0	0	0
Federal Std (0.14 ppm, 24-hr)	0	0	0	0	0	0

Source: California Air Quality Data, Annual Summary, California Air Resources Board

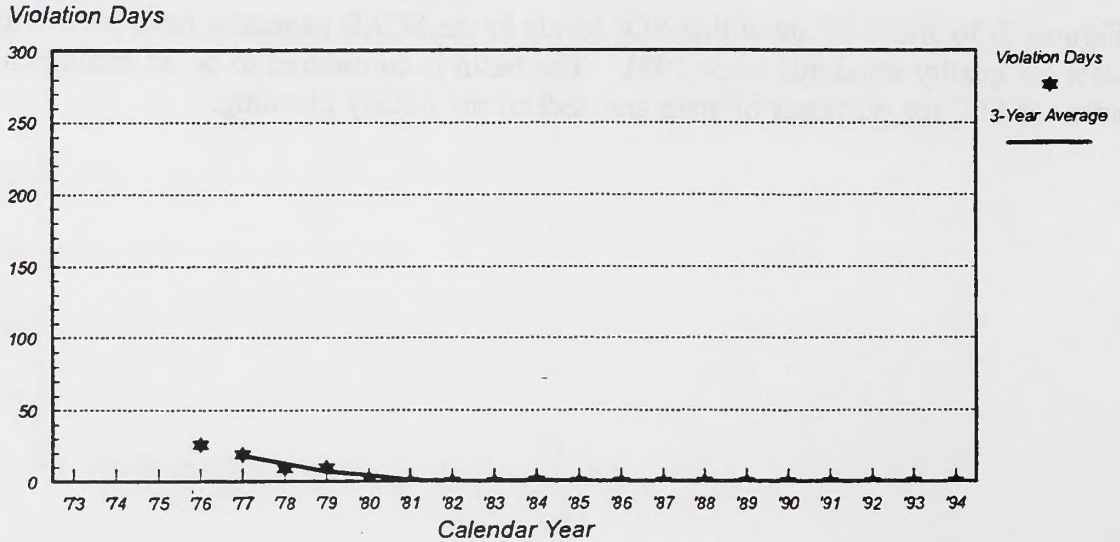
Figures 2-36 and 2-37 show that SO_2 levels in the SCAB generally have been within state air quality standards since 1981. The basin is considered to be an attainment area for SO_2 for purposes of state and federal air quality planning.

Figure 2-36
Maximum 24-Hour Average SO2 Levels
in South Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-37
Violations of the California
24-Hour SO2 Standard
South Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

South Central Coast Air Basin. Table 2-17 shows the California and federal air quality standards for SO_2, and the maximum levels recorded in the South Central Coast Air Basin during the period 1989-1994. The data show that SO_2 levels in the SCCAB have been well within the federal air quality standards. The most recent violations of the more stringent state standard were in 1990 and 1993.

Table 2-17
Sulfur Dioxide Levels in the South Central Coast Air Basin

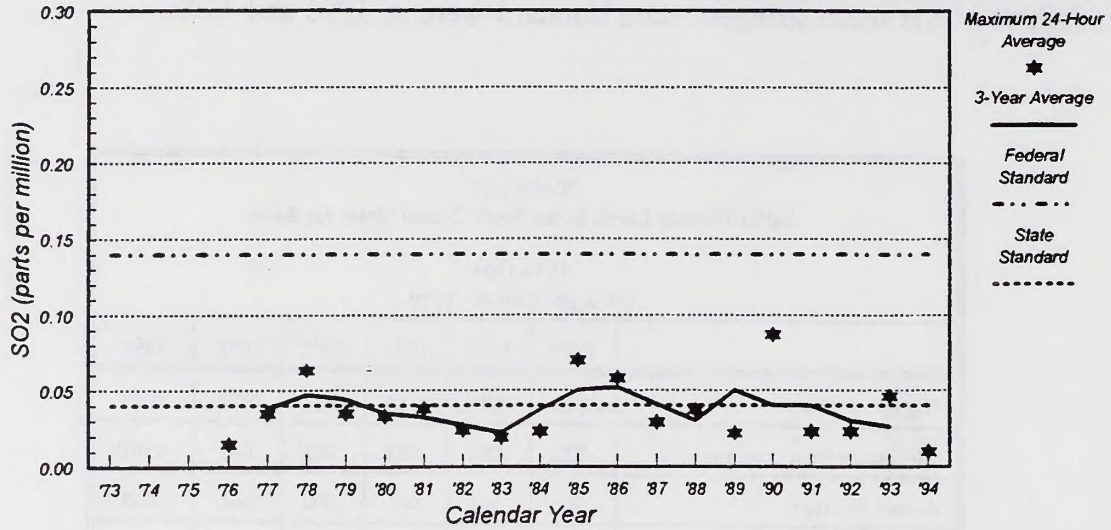
1989-1994
(parts per million - ppm)

	1989	1990	1991	1992	1993	1994
Highest 1-Hour	0.22	0.75	0.14	0.17	0.57	0.10
Highest 24-Hour Average	.022	.087	.023	.023	.046	0.010
Annual Average	.001	.001	.001	.000	.001	.000
Number of Days Exceeding						
State Standard (0.04 ppm, 24-hr)	0	1	0	0	1	0
State Standard (0.25 ppm, 1-hr)	0	1	0	0	1	0
Federal Std (0.14 ppm, 24-hr)	0	0	0	0	0	0
Federal Std (0.03 ppm, AnnAvg)	0	0	0	0	0	0

Source: California Air Quality Data, Annual Summary, California Air Resources Board

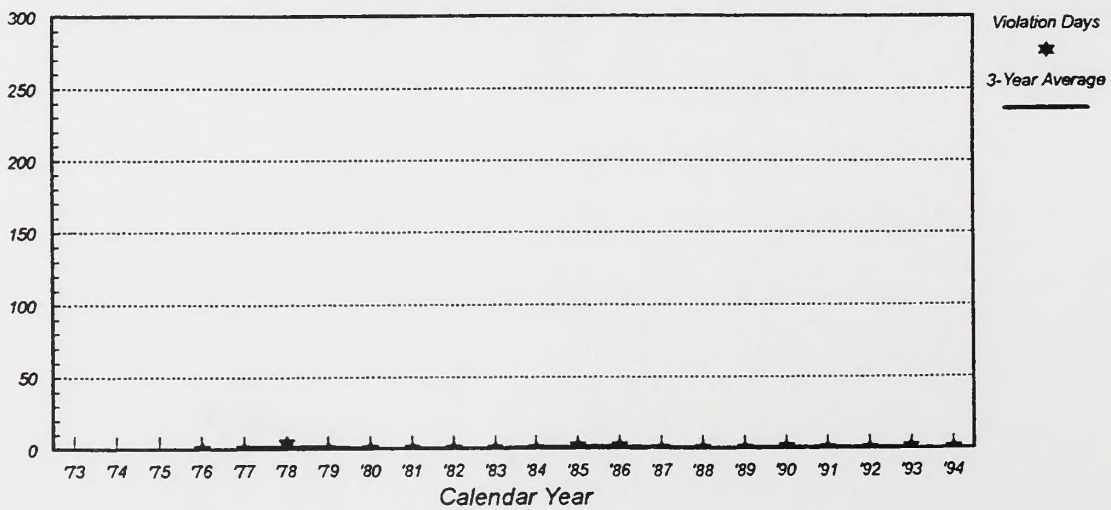
Figures 2-38 and 2-39 show SO_2 levels in the SCCAB. The Ventura County area of the basin is considered to be in attainment of the state and federal SO_2 standards; all other areas are unclassified for the purposes of state and federal air quality planning.

Figure 2-38
Maximum 24-Hour Average SO2 Levels
In South Central Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-39
Violations of the California
24-Hour SO2 Standard
South Central Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

San Diego Air Basin. Table 2-18 shows the air quality standards for SO_2, plus the maximum levels recorded in the SDAB in the period between 1989 and 1994. The data show that SO_2 concentrations have been well below the state and federal standards for several years.

Table 2-18
Sulfur Dioxide Levels in the San Diego Air Basin

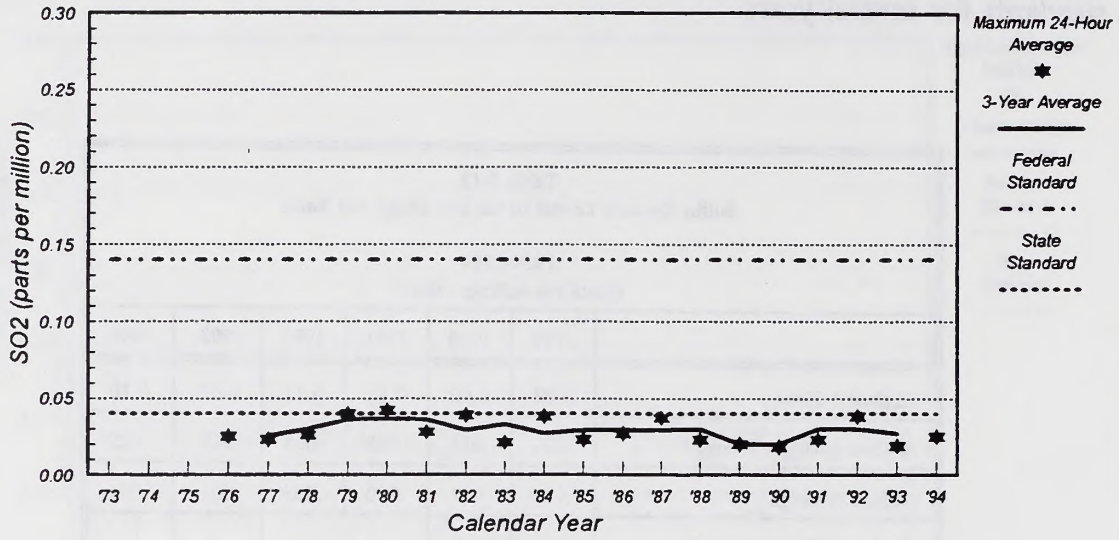
1989-1994
(parts per million - ppm)

	1989	1990	1991	1992	1993	1994
Highest 1-Hour	0.08	0.06	0.11	0.12	0.07	0.10
Highest 24-Hour Average	.020	.018	.023	.038	.019	.025
Annual Average	.003	.003	.002	.003	.001	.001
Number of Days Exceeding						
State Std (0.04 ppm, 24-hr)	0	0	0	0	0	0
State Standard (0.25 ppm, 1-hr)	0	0	0	0	0	0
Federal Std (0.14 ppm, 24-hr)	0	0	0	0	0	0
Federal Std (0.03 ppm, AnnAvg)	0	0	0	0	0	0

Source: California Air Quality Data, Annual Summary, California.

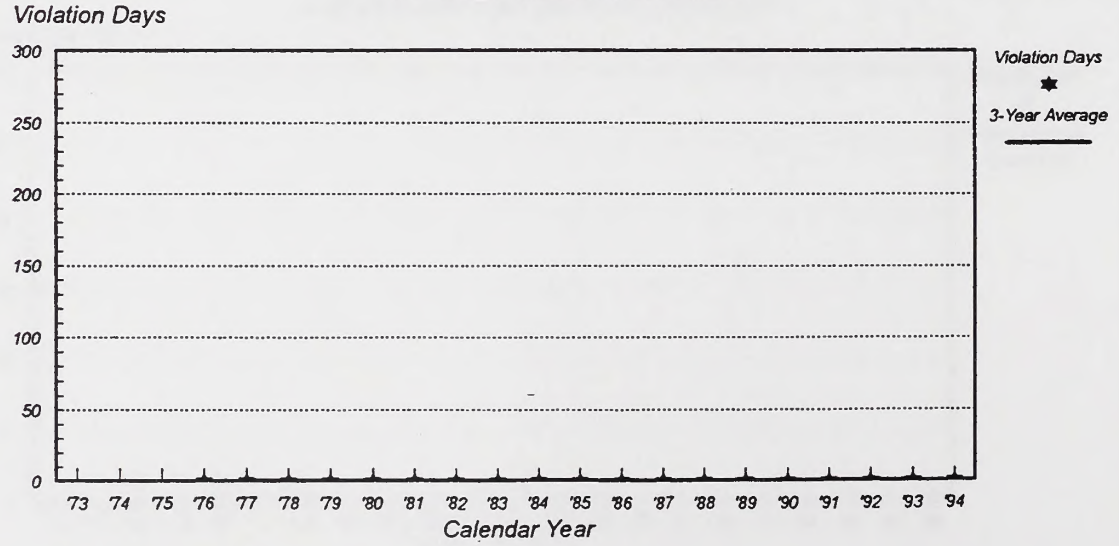
Figures 2-40 and 2-41 show that SO_2 levels in the SDAB are within state air quality standards. The basin is considered to be an attainment area for SO_2 for purposes of state and federal air quality planning.

Figure 2-40
Maximum 24-Hour Average SO2 Levels
San Diego Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-41
Violations of the California 24-Hour SO2 Standard
San Diego Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

2.4.5 Suspended Sulfates

Suspended sulfates are the product of further oxidation of sulfur dioxide. Elevated levels can also be due to natural causes, such as wind-blown dust, in some parts of the state. There is no federal ambient air quality standard for sulfates.

Southeast Desert Air Basin. Table 2-19 shows the California air quality standard for sulfate and the maximum levels recorded in the basin during the period 1984-1994. In 1985 and 1986, the maximum readings were abnormally high. These aberrant levels were recorded at China Lake during a brief period of extremely high winds that entrained the naturally occurring sulfates from the dry lake there. To give some perspective to the readings, the second-highest readings for the 1984-1994 period are also presented.

Table 2-19
Suspended Sulfate Levels in the Southeast Desert Air Basin

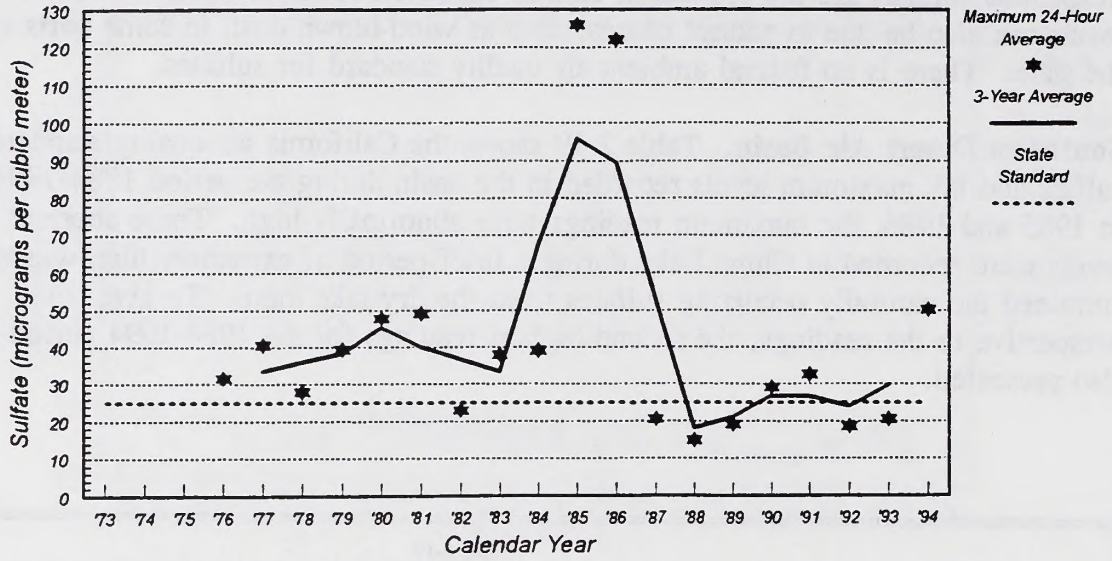
1984-1994
(micrograms per cubic meter - $\mu g/m^3$)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Highest 24-Hour Average	39.0	126.1	122.0	20.5	14.8	19.1	29.1	32.5	18.6	14.0	50.1
2nd Highest 24-Hour Average	29.9	42.7	22.5	16.9	14.5	18.3	28.1	29.9	17.2	14.0	26.8
Number of Days Exceeding State Standard (25 $\mu g/m^3$, 24-hr)	2	2	1	0	0	0	3	2	0	0	3

Source: California Air Quality Data, Annual Summary, California Air Resources Board

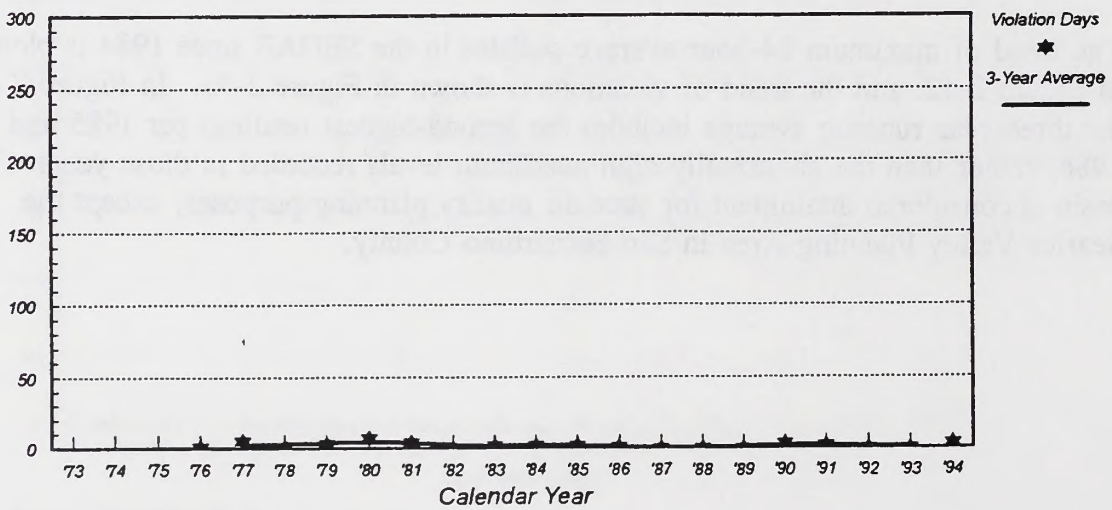
The trend of maximum 24-hour average sulfates in the SEDAB since 1984 is plotted in Figure 2-42, and the trend of violations is shown in Figure 2-43. In Figure 2-42, the three-year running average includes the second-highest readings for 1985 and 1986, rather than the abnormally high maximum levels recorded in those years. The basin is considered attainment for state air quality planning purposes, except the Searles Valley Planning Area in San Bernardino County.

Figure 2-42
Maximum 24-Hour Average Sulfate Levels
In Southeast Desert Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-43
Violations of the California
24-Hour Sulfate Standard
Southeast Desert Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Joshua Tree National Park. Due to the absence of a suspended sulfate monitor in the JTNP, no suspended sulfate ambient data are available for the JTNP. Because the JTNP is located in the SEDAB, the suspended sulfate levels for the JTNP are expected to be at or below the worst-case levels shown above for the SEDAB.

South Coast Air Basin. Table 2-20 shows the California air quality standard for suspended sulfate and the maximum levels recorded in the basin during the period 1984-1994. Maximum 24-hour sulfate levels have met the state standard since 1989.

Table 2-19
Suspended Sulfate Levels in the South Coast Air Basin

1984-1994
(micrograms per cubic meter - $\mu g/m^3$)

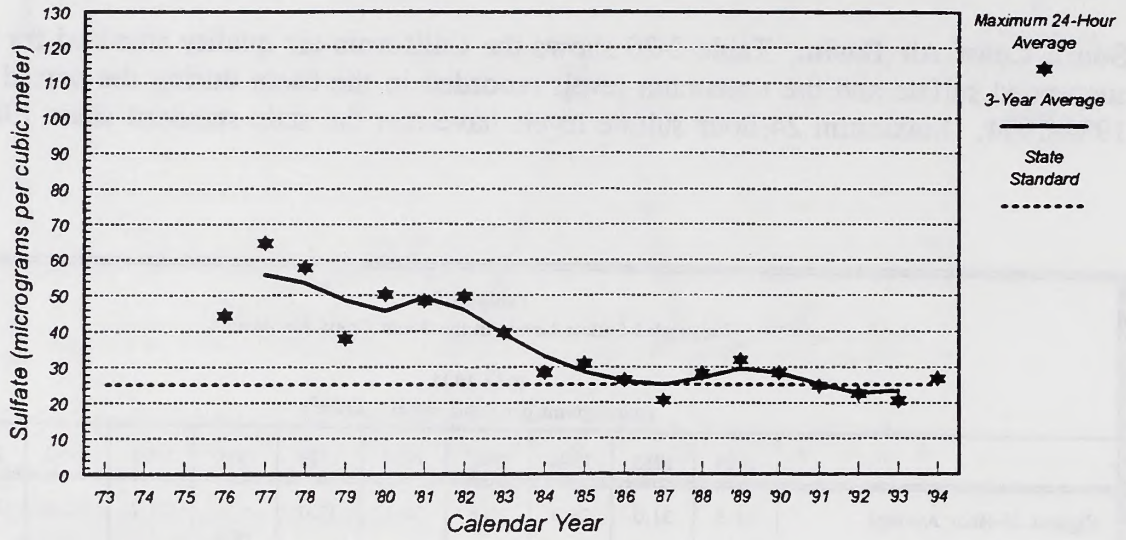
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Highest 24-Hour Average	28.3	31.0	26.3	20.6	28.1	32.0	28.4	24.7	22.6	20.5	26.8
Number of Days Exceeding State Standard (25 $\mu g/m^3$, 24-hr)	2	1	4	0	2	1	3	0	0	0	1

Source: California Air Quality Data, Annual Summary, California Air Resources Board

The trend of maximum 24-hour average sulfates in the SCAB since 1984 is plotted in Figure 2-44, and the trend of violations is shown in Figure 2-45. Figure 2-44 shows that maximum sulfate concentrations have been in a general decline for the last fifteen years.

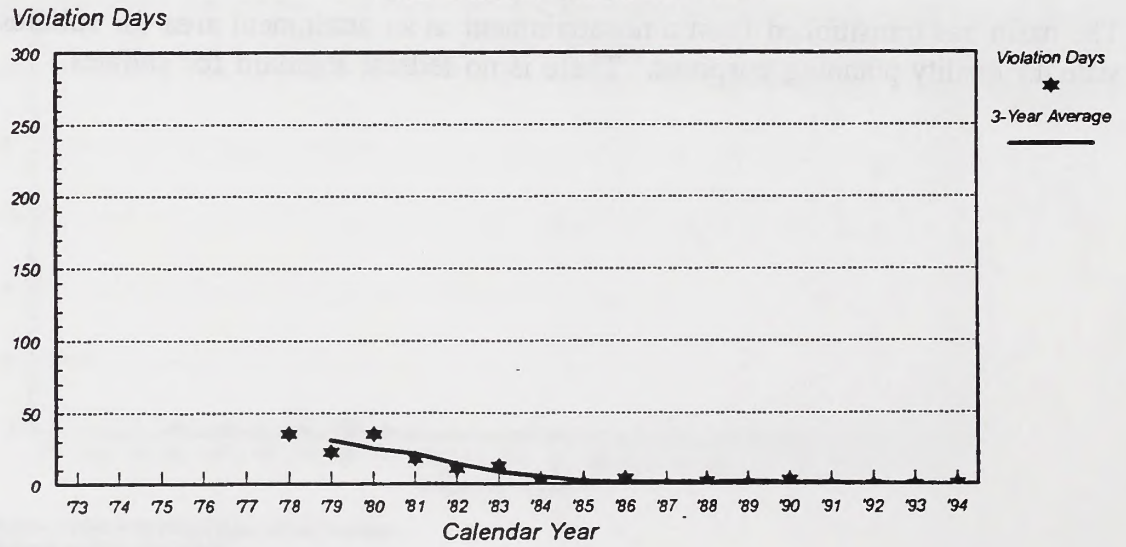
The basin has transitioned from a nonattainment to an attainment area for sulfates for state air quality planning purposes. There is no federal standard for sulfates.

Figure 2-44
Maximum 24-Hour Average Sulfate Levels in South Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-45
Violations of the California 24-Hour Sulfate Standard South Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

South Central Coast Air Basin. Table 2-21 shows the California air quality standards for suspended sulfates, and the maximum levels recorded in the basin during the period between 1984 and 1990. The data show that suspended sulfate levels in the SCCAB have been ~~well~~ within the air quality standards since 1985. Suspended sulfates were not measured in the South Central Coast Air Basin after 1990.

Table 2-21
Suspended Sulfate Levels in the South Central Coast Air Basin

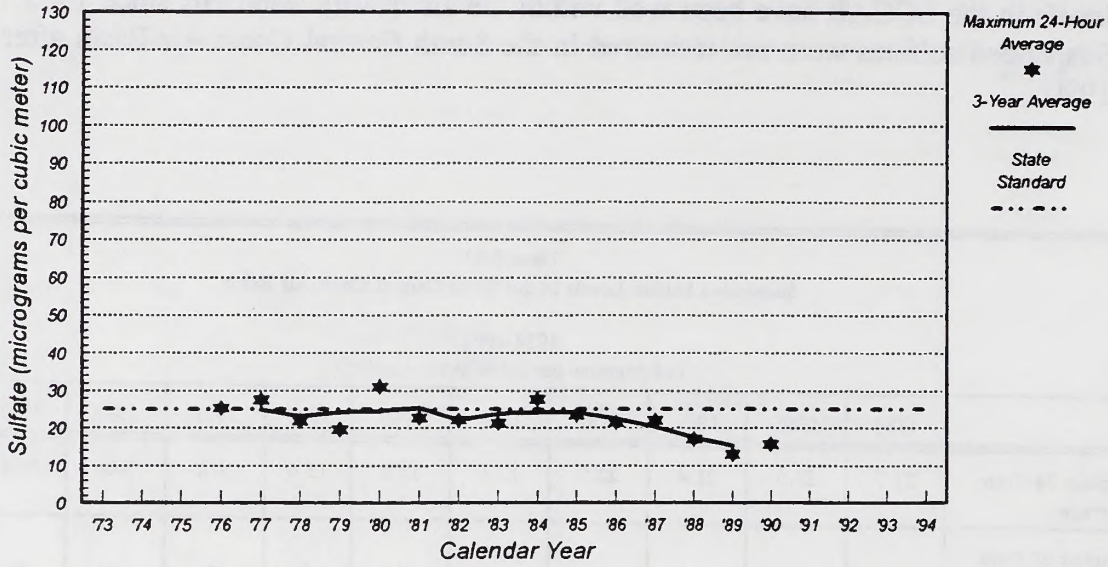
1984-1994
(micrograms per cubic meter - $\mu g/m^3$)

	1987	1987	1987	1987	1988	1987	1990	1988	1987	1993	1994
Highest 24-Hour Average	27.7	23.5	22.0	22.0	17.1	13.0	15.6	N/A	N/A	N/A	N/A
Number of Days Exceeding State Standard ($25\ \mu g/m^3$, 24-hr)	1	0	0	0	0	0	0	0	0	0	–

Source: California Air Quality Data, Annual Summary, California Air Resources Board

The trend of maximum 24-hour average sulfates in the SCCAB is plotted in Figures 2-46 and 2-47. The basin is considered attainment for state air quality planning purposes.

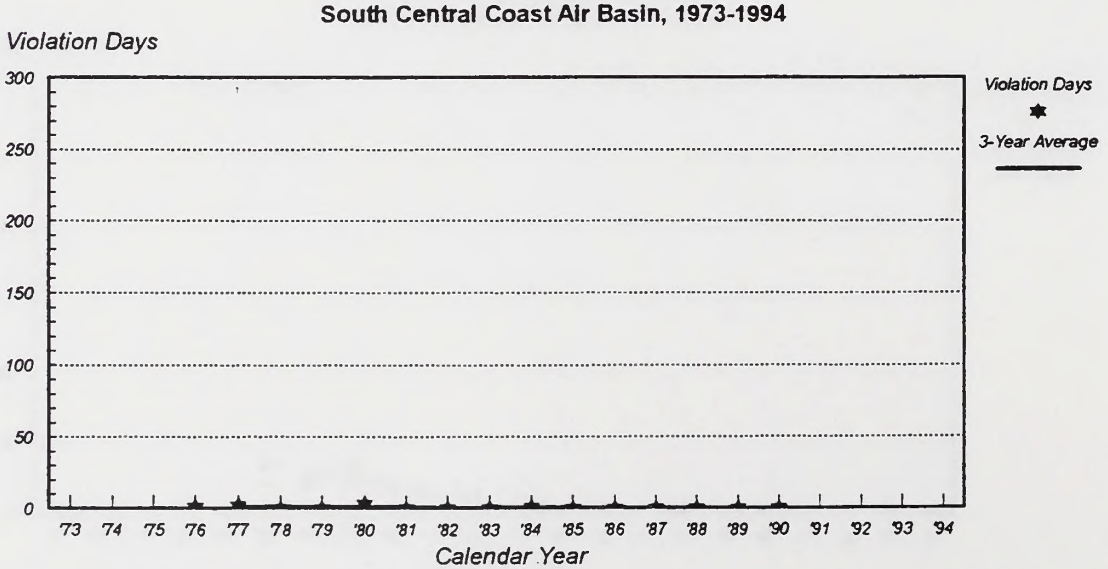
Figure 2-46
Maximum 24-Hour Average Sulfate Levels In South Central Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Note: Total suspended Sulfates were monitored in South Central Coast Air Basin only between 1976 and 1990.

Figure 2-47
Violations of the California 24-Hour Sulfate Standard South Central Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Note: Total suspended Sulfates were monitored in South Central Coast Air Basin only between 1976 and 1990.

San Diego Air Basin. Table 2-22 shows the California air quality standards for suspended sulfate, and the maximum levels recorded in the basin during the period between 1984 and 1994. The data show that suspended sulfate levels in the SDAB have been well within air quality standards.

Table 2-22
Suspended Sulfate Levels in the San Diego Air Basin

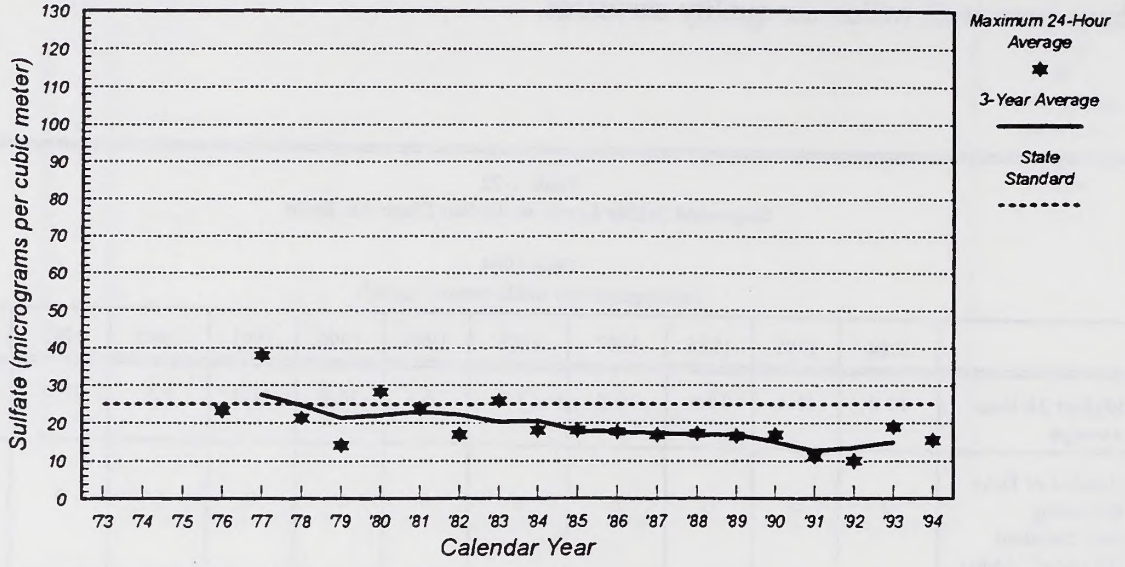
1984-1994
(micrograms per cubic meter - $\mu g/m^3$)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Highest 24-Hour Average	18.0	18.1	17.6	16.8	17.2	16.5	16.8	18.1	9.9	19.0	15.4
Number of Days Exceeding State Standard (25 $\mu g/m^3$, 24-hr)	0	0	0	0	0	0	0	0	0	0	0

Source: California Air Quality Data, Annual Summary, California Air Resources Board

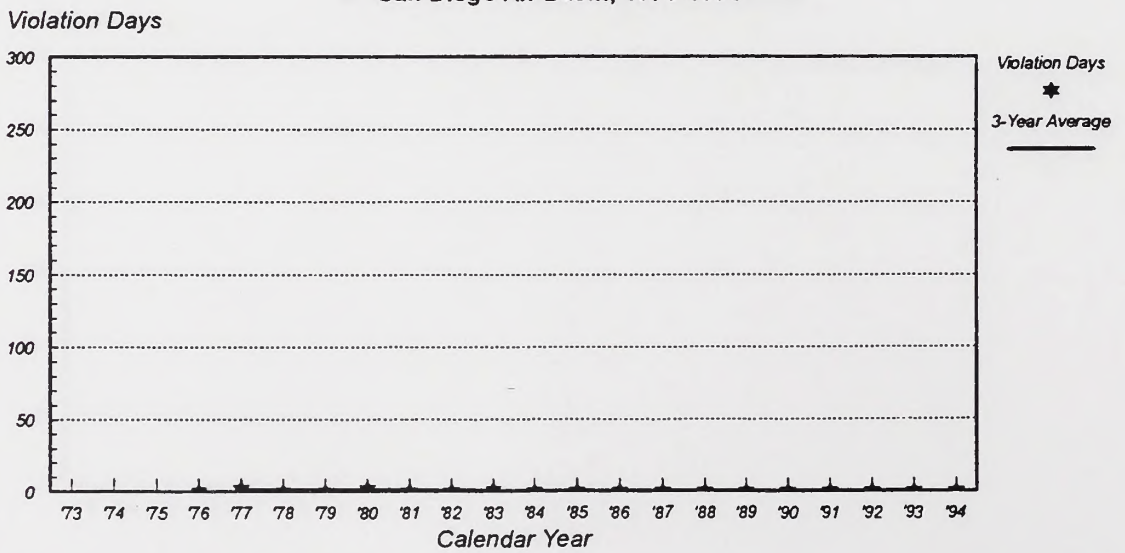
The trend of maximum 24-hour average sulfates in the SDAB is plotted in Figure 2-48 and Figure 2-49. The basin is considered attainment for state air quality planning purposes.

Figure 2-48
Maximum 24-Hour Average Sulfate Levels
San Diego Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-49
Violations of the California
24-Hour Sulfate Standard
San Diego Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

2.4.6 Fine Particulate (PM_{10})

Particulate matter in the air is caused by a combination of wind-blown fugitive dust, particles emitted from combustion sources (usually carbon particles), and organic, sulfate, and nitrate aerosols formed in the air from emitted hydrocarbons, sulfur oxides, and oxides of nitrogen. Beginning in 1984, the ARB adopted standards for fine particulate (PM_{10} - particulate matter less than 10 microns in size), and phased out the pre-existing total suspended particulate (TSP) standards. PM_{10} standards were substituted for TSP standards because PM_{10} corresponds to the size range of inhalable particulate related to human health. In 1987, EPA also replaced national TSP standards with PM_{10} standards.

Southeast Desert Air Basin. Table 2-23 shows the California and federal air quality standards for fine particulate, as well as the maximum and second-highest levels recorded in the SEDAB during the period 1984-1994. The data show that the state standard has been exceeded about 50 days per year, while the federal standard has been exceeded fewer than 10 days per year. However, because PM_{10} is measured only every six days at each monitoring location, the actual number of excesses may be roughly six times the reported values. Also shown in Table 2-23 are the highest 24-hour and annual average PM_{10} concentrations measured during on-site monitoring that occurred between April 1990 and March 1991 at the Project Site.

Maximum 24-hour levels and violations for the period 1984-1994 are graphically depicted in Figures 2-50 and 2-51, respectively. There is no clear trend evident in these data.

The Coachella Valley area in the SEDAB is considered a serious PM_{10} nonattainment area. Figure 2-52 shows the annual average PM_{10} concentrations at Banning and in the Coachella Valley (Palm Springs and Indio). The data indicate a downward trend in PM_{10} levels. Exceedances of the federal 24-hour standard occur infrequently and are not limited to any one season. The exceedances of the more stringent state standard occur in every month of the year. Studies of high PM_{10} days have shown wind-blown dust to be a significant contributor to PM_{10} in this area (SCAQMD).

The Imperial and Searles Valley Planning Areas of the SEDAB are designated as moderate nonattainment areas with respect to the federal PM_{10} standards. The rest of the air basin, including the Project Site, is considered unclassified for federal air quality planning purposes. The SEDAB is considered a serious nonattainment area for the purposes of the state PM_{10} standard.

Joshua Tree National Park. Due to the absence of a PM_{10} monitor in the JTNP, no PM_{10} ambient data are available for the JTNP. Because the JTNP is located in the

Table 2-23
Fine Particulate (PM_{10}) Levels in Southeast Desert Air Basin

1984-1994
(micrograms per cubic meter - $\mu g/m^3$)

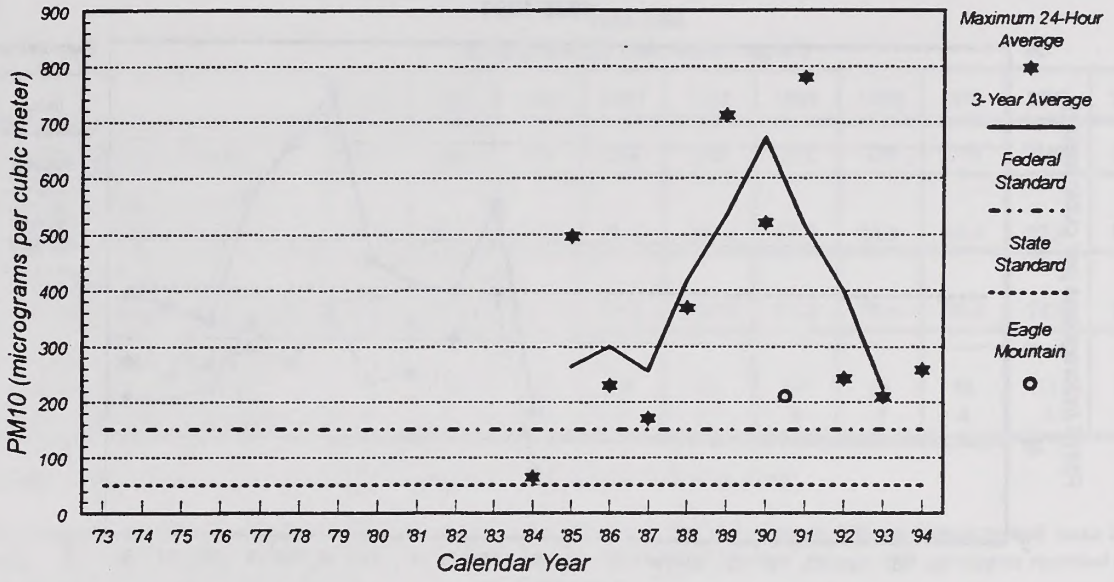
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Highest 24-Hour Average	65	496	230	171	368	712	520	780	242	175	258
2nd-highest 24-Hour Average	60	358	191	163	192	676	462	534	175	166	182
On-site Highest 24-Hour Average							210.4[1]				
Annual Geometric Mean * (State Standard = 30 $\mu g/m^3$)	37.3	59.9	59.3	65.2	58.6	66.4	64.9	59.8	43.7	47.2	45.3
On-site Annual Geometric Mean *							21.7[2]				
Annual Arithmetic Mean * (Federal Standard = 50 $\mu g/m^3$)	39.5	70.9	64.1	75.8	66.2	90.3	79.3	63.1	47.3	52.4	48.7
On-site Annual Arithmetic Mean *							29.8[2]				
Number of Days Exceeding State Std (50 $\mu g/m^3$, 24-hr)	6	57	54	56	56	63	64	58	43	47	65
Federal Std (150 $\mu g/m^3$, 24-hr)	0	6	2	3	2	9	7	7	2	3	4

Source: California Air Quality Data, Annual Summary, California Air Resources Board
* No basinwide summary available. The annual mean for each year is based on the station with the highest annual mean in the basin.
1. Highest 24-hour PM_{10} concentration measured at Eagle Mountain between March 1990 and April 1991.
2. Annual average PM_{10} concentration measured at Eagle Mountain between March 1990 and April 1991.

SEDAB just to the north and west of the Project Site, the PM_{10} levels for the JTNP are expected to be between the worst-case levels shown above for the SEDAB and those measured at the Project Site.

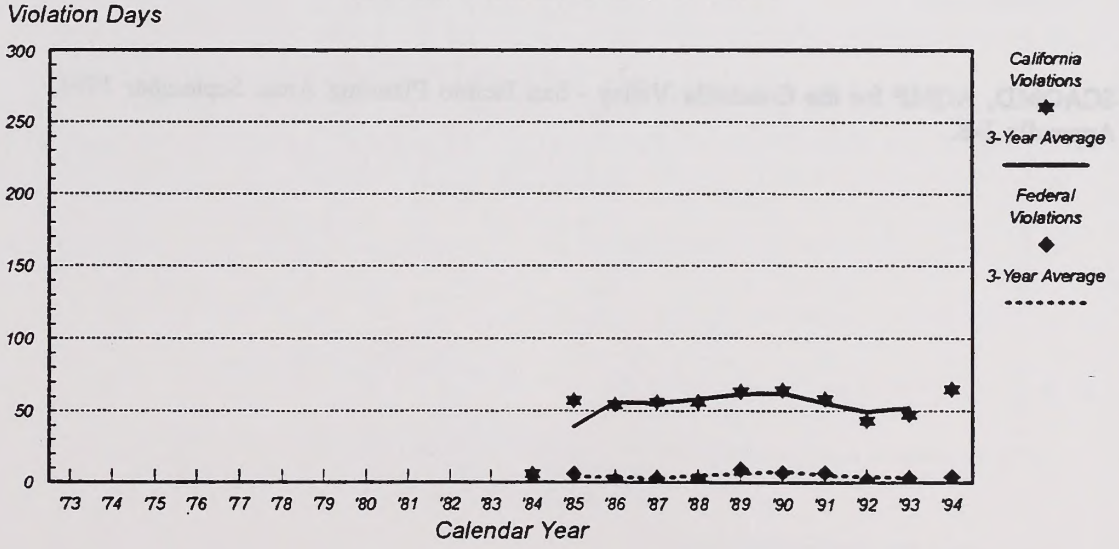
South Coast Air Basin. Table 2-24 shows the California and federal air quality standards for PM_{10}, as well as the maximum levels recorded in the SCAB during the period 1984-1994. The 24-hour levels are four to ten times the state standard. Maximum 24-hour levels and violations for the period 1984-1993 are graphically depicted in Figures 2-53 and 2-54, respectively. However, because PM_{10} is measured only every six days at each monitoring location, the actual number of excesses may be roughly six times the reported values.

Figure 2-50
Maximum 24-Hour PM10
in Southeast Desert Air Basin, 1973-1994



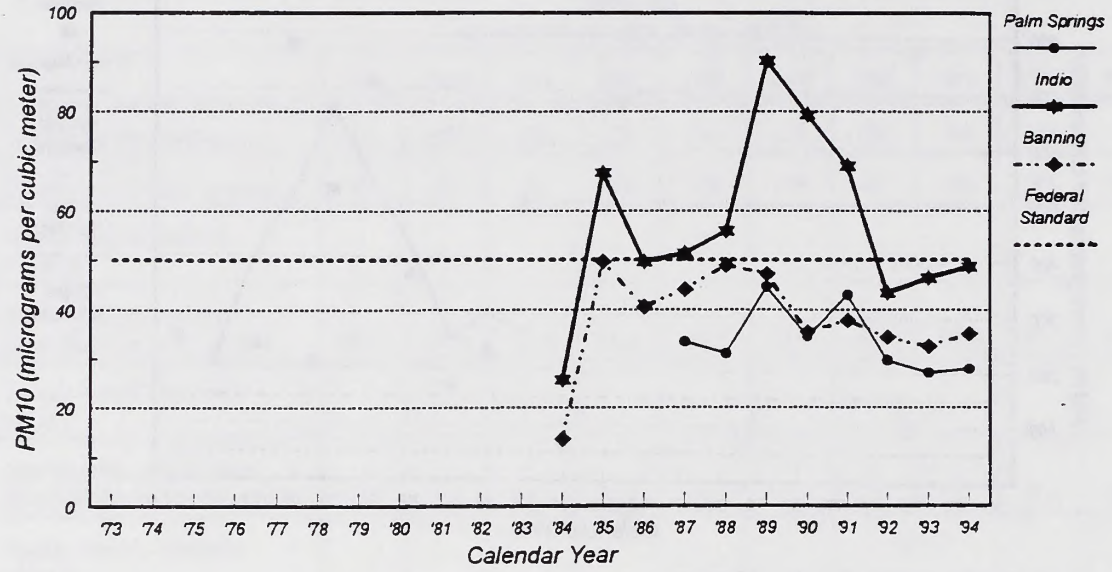
Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-51
Violations of the California and Federal
24-Hour PM10 Standards
Southeast Desert Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-52
Annual Average PM10 Concentrations
1985-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

SCAQMD, AQMP for the Coachella Valley - San Jacinto Planning Area, September 1994, Appendix I-B.

Table 2-24
PM_{10} Levels in South Coast Air Basin

1984-1994
(micrograms per cubic meter - $\mu g/m^3$)

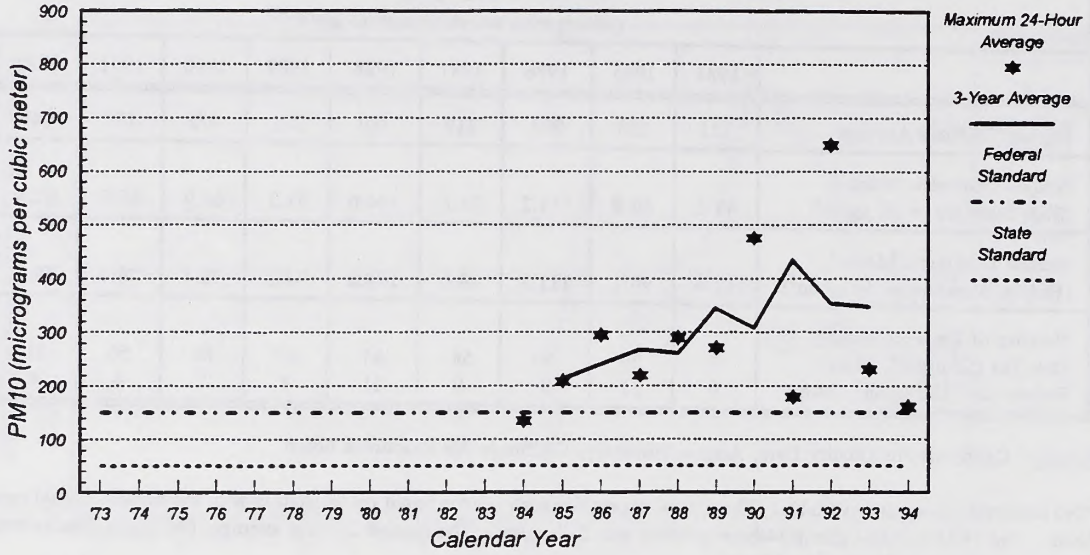
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Highest 24-Hour Average	135	208	294	219	289	271	475	179	649	231	161
Annual Geometric Mean * (State Standard = 30 $\mu g/m^3$)	41.2	80.9	111.2	89.6	104.6	81.3	66.9	66.9	62.4	58.0	55.9
Annual Arithmetic Mean * (Federal Standard = 50 $\mu g/m^3$)	53.4	96.1	111.3	89.6	104.6	94.2	78.4	76.0	78.9	72.4	65.7
Number of Days Exceeding											
State Std (50 $\mu g/m^3$, 24-hr)	7	59	60	58	65	67	64	56	51	61	58
Federal Std (150 $\mu g/m^3$, 24-hr)	0	11	8	9	11	8	7	4	4	4	1

Source: California Air Quality Data, Annual Summary, California Air Resources Board

*No basinwide summary available. The annual means for each year is based on the station with the highest annual mean in the basin. The 1992 second-highest 24-hour average was 222 $\mu g/m^3$. The highest 24-hour average, 649 $\mu g/m$, was recorded at the monitoring station at the Ontario Airport.

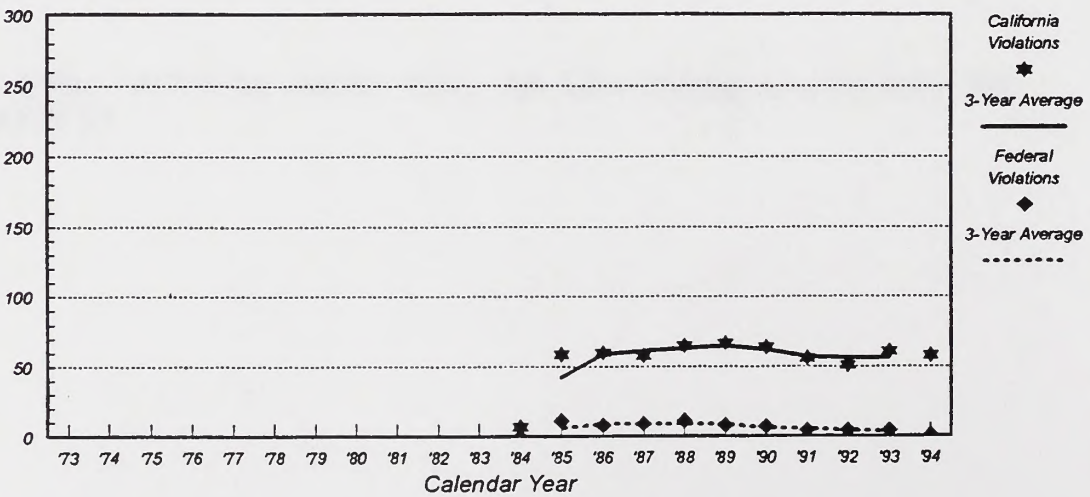
The Riverside, Los Angeles, Orange, and San Bernardino Counties in the South Coast Air Basin are designated as serious federal PM_{10} nonattainment areas. Because the federal EPA has classified these areas as serious, the SCAQMD is required to adopt the use of best available control measures (BACMs) on existing stationary sources. The BACM requirements must be implemented by February 8, 1997, four years from the date when EPA reclassified these areas from moderate to serious nonattainment. The SCAB is considered a serious nonattainment area for the purposes of the state PM_{10} standard.

Figure 2-53
Maximum 24-Hour PM10
in South Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-54
Violations of the California and Federal
24-Hour PM10 Standards
South Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

South Central Coast Air Basin. Table 2-25 shows the California and federal air quality standards for PM_{10}, as well as the maximum and second-highest levels recorded in the SCCAB between 1989 and 1994. The SCCAB is unclassified or attainment with the federal PM_{10} air quality standards. The state 24-hour PM_{10} standard is exceeded about 30 days per year, while the annual state standard has been exceeded each year. However, because PM_{10} is measured only every six days at each monitoring location the actual number of excesses may be roughly six times the reported values. The SCCAB is considered nonattainment for the purposes of the state PM_{10} standard.

Table 2-25
PM_{10} Levels in South Central Coast Air Basin

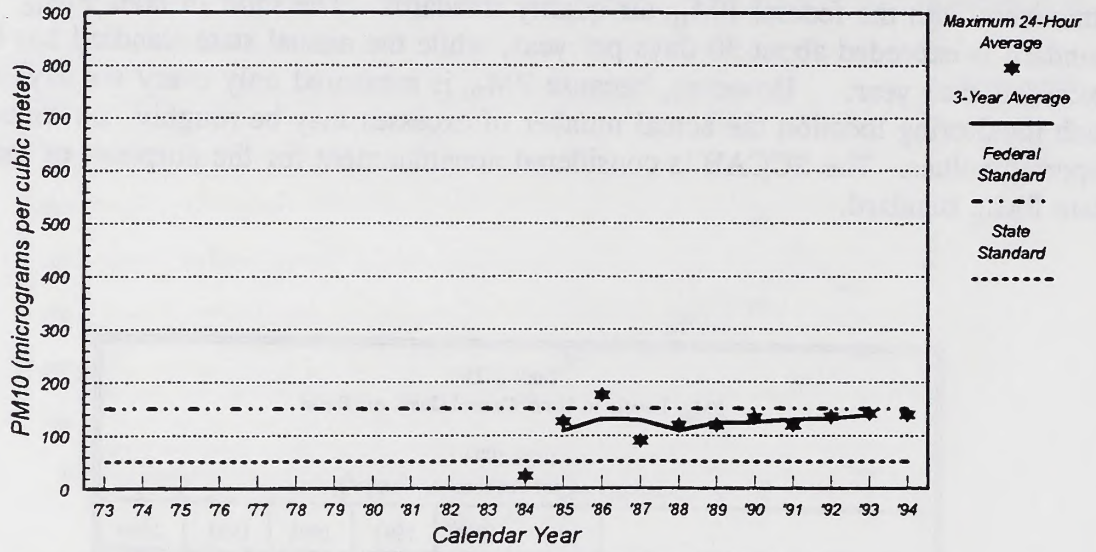
1989-1994
(micrograms per cubic meter - $\mu g/m^3$)

	1989	1990	1991	1992	1993	1994
Highest 24-Hour Average	119	133	119	135	141	139
2nd Highest 24-Hour Average	92	102	105	131	121	112
Annual Geometric Mean * (State Standard = 30 $\mu g/m^3$)	40.8	35.3	37.4	37.2	36.8	27.6
Annual Arithmetic Mean * (Federal Standard = 50 $\mu g/m^3$)	42.9	37.8	49.3	42.8	43.6	31.9
Number of Days Exceeding State Std (50 $\mu g/m^3$, 24-hr) Federal Std (150 $\mu g/m^3$, 24-hr)	 37 0	 22 0	 35 0	 17 0	 24 0	 14 0

Source: California Air Quality Data, Annual Summary, California Air Resources Board
* No basinwide summary available. The annual mean is based on the station with the highest annual mean in the basin.

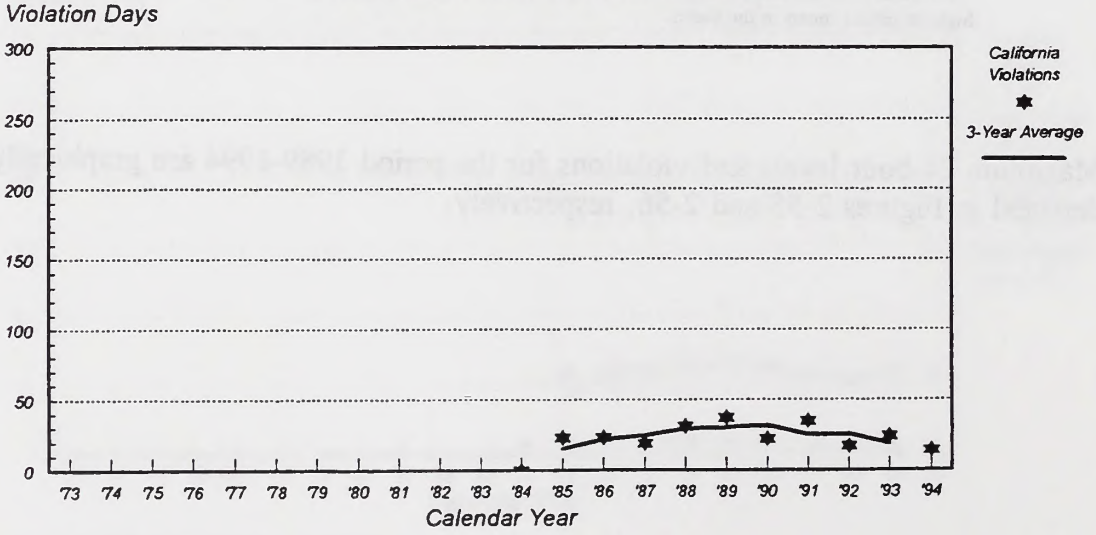
Maximum 24-hour levels and violations for the period 1989-1994 are graphically depicted in Figures 2-55 and 2-56, respectively.

Figure 2-55
Maximum 24-Hour PM10
In South Central Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-56
Violations of the California
24-Hour PM10 Standard
South Central Coast Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

San Diego Air Basin. Table 2-26 shows the California and federal air quality standards for PM_{10}, as well as the maximum and second-highest levels recorded in the SDAB between 1984 and 1994. The data show that the SDAB is in attainment with the federal PM_{10} air quality standards. The state 24-hour PM_{10} standard has been exceeded fewer than 15 days per year, except in 1989, when the standard was exceeded on 28 days, and in 1994, where PM_{10} levels at Otay Mesa were well above other areas of the county. However, because PM_{10} is measured only every six days at each monitoring location the actual number of excesses may be roughly six times the reported values. The data over this five-year period do not show a specific trend in the maximum recorded 24-hour PM_{10} concentrations. The SDAB exceeds the state PM_{10} standard, and is considered nonattainment for the purposes of the state PM_{10} standard.

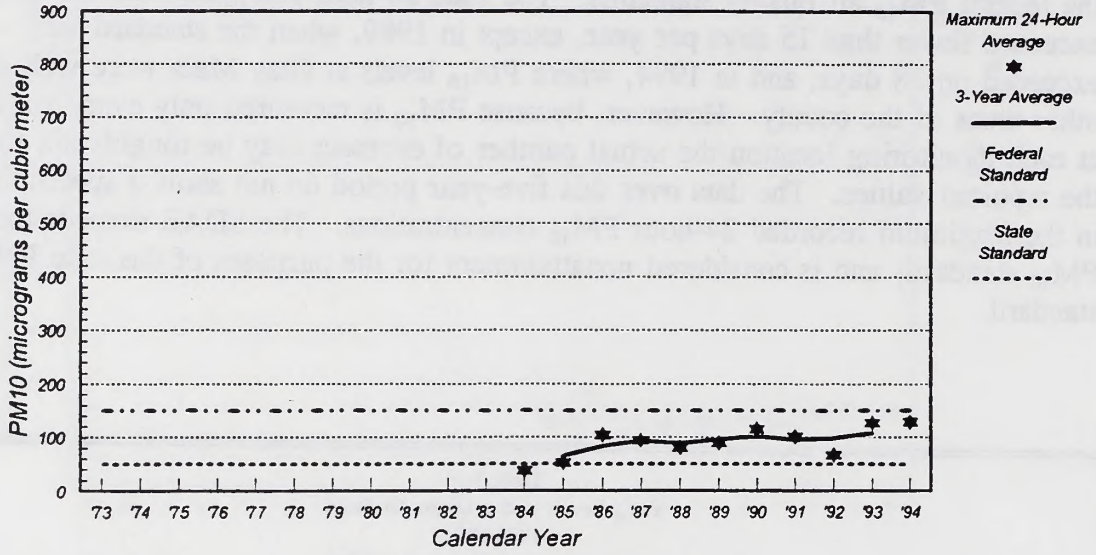
Table 2-26
PM_{10} Levels in San Diego Air Basin
1984-1994
(micrograms per cubic meter - $\mu g/m^3$)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Highest 24-Hour Average	38	53	104	94	62	90	115	101	67	127	129
2nd Highest 24-Hour Average	38	81	77	81	81	90	94	62	58	105	121
Annual Geometric Mean * ($\mu g/m^3$) (State Standard = 30 $\mu g/m^3$)	25.4	34.1	37.5	34.6	34.1	41.3	33.4	33.0	33.5	41.1	45.2
Annual Arithmetic Mean * ($\mu g/m^3$) (Federal Standard = 50 $\mu g/m^3$)	26.5	35.2	39.5	38.4	40.1	44.6	33.0	40.7	35.8	47.1	50.9
Number of Days Exceeding											
State Std (50 $\mu g/m^3$, 24-hr)	0	3	8	15	18	28	11	4	7	14	25
Federal Std (150 $\mu g/m^3$, 24-hr)	0	0	0	0	0	0	0	0	0	0	0

Source: California Air Quality Data, Annual Summary, California Air Resources Board
* No basinwide summary available. The annual mean is based on the station with the highest annual mean in the basin.

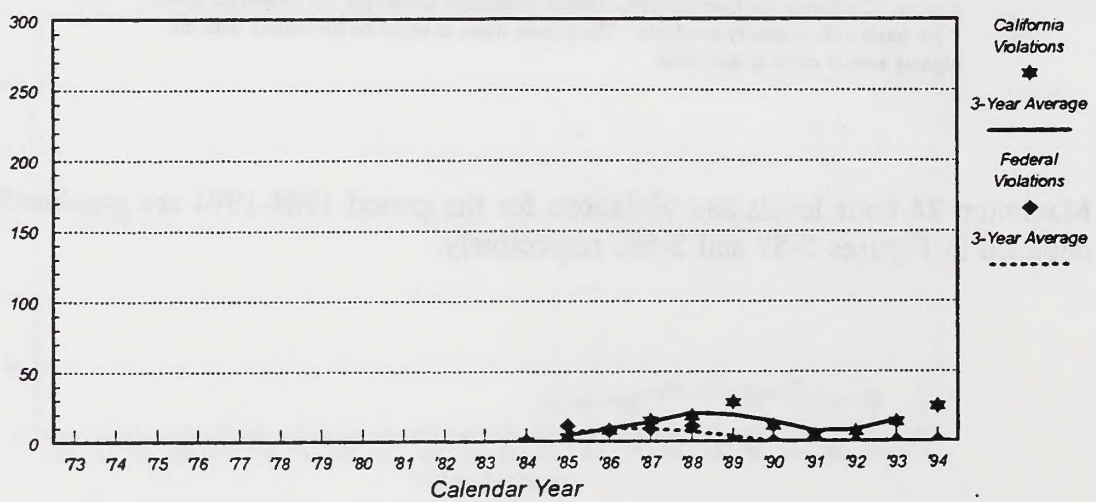
Maximum 24-hour levels and violations for the period 1984-1994 are graphically depicted in Figures 2-57 and 2-58, respectively.

Figure 2-57
Maximum 24-Hour PM10
in San Diego Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 2-58
Violations of the California
24-Hour PM10 Standard
San Diego Air Basin, 1973-1994



Source: California Air Quality Data, Annual Summary, California Air Resources Board

2.5 Other Air Quality Issues

2.5.1 Regional Visibility

Visibility refers to the clarity of the atmosphere and is typically measured as the distance one can see at a particular location and time. The absorption and scattering of light by both gases and particles in the atmosphere restricts visibility. Natural phenomena that contribute to a decrease in visibility include fog, precipitation, blowing sand/snow, and relative humidities greater than 70 percent. Man-made conditions that reduce visibility include the emission of combustion gases that transform in the atmosphere into very small particles termed "aerosols."

Southeast Desert Air Basin. The Southeast Desert Air Basin experiences improving visibilities as you move from west to east. Near the urbanized western edge of the air basin, midday visibilities average 15 miles; in the remote desert regions at the east end, average visibilities approach 70 miles. As relative humidities in the air basin are usually below 70 percent, water vapor in the air does not significantly influence visibility levels. In the absence of large cities or industrial complexes, the greatest contribution to visibility degradation is made by the transport of aerosols from the South Coast and southern San Joaquin Valley Air Basins.

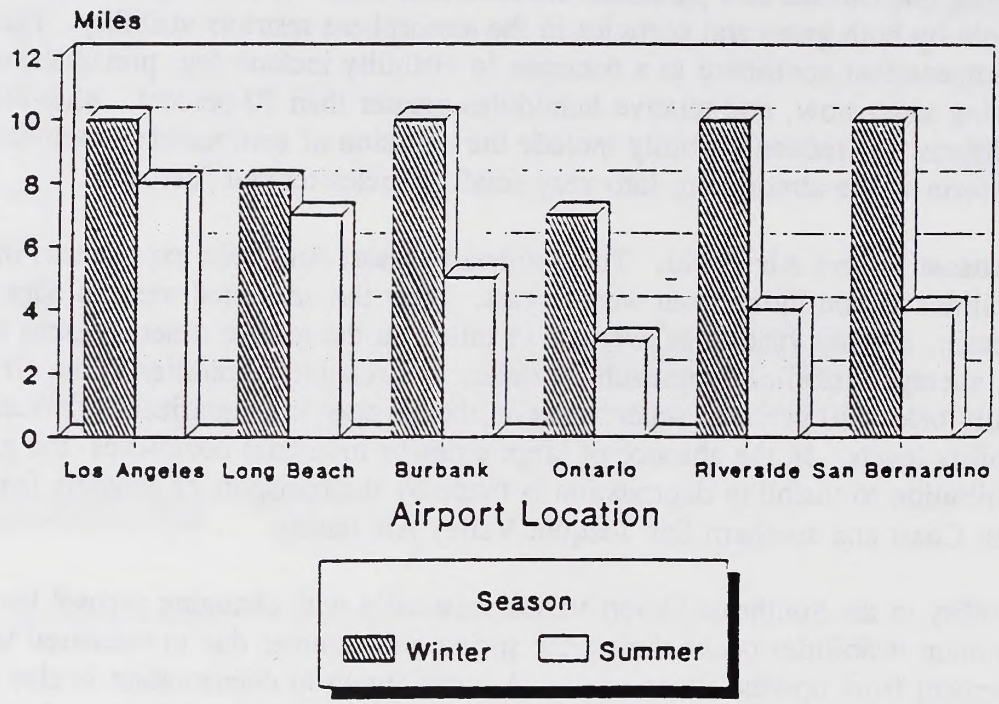
Visibility in the Southeast Desert varies seasonally with changing aerosol levels. Minimum visibilities occur during the spring and summer due to increased transport of aerosol from upwind urban areas. A contribution to deterioration is also made by local sources of fugitive dust during drier, windier summer conditions. Limited data indicate that the hourly variation in visibility is small, confirming the small effect on visibility contributed by water vapor.

Historically, the locations nearest the air basin where visibility was monitored were the Ontario and Riverside airports in the eastern end of the South Coast Air Basin. A comparison of winter versus summer median daily low visibilities for the Ontario and Riverside airports is included in Figure 2-59.

Joshua Tree National Park. Because the JTNP is located in the SEDAB, the discussion above for the SEDAB is relevant to the JTNP. Since the JTNP is located in the desert region of the SEDAB, visibilities in JTNP are at the higher end of the range discussed above. According to a study conducted by the Colorado State University ("Spatial And Temporal Patterns And The Chemical Composition Of The Haze In The United States: An Analysis of Data from the IMPROVED Network 1988-1991," February 1993), the best 10 percent of winter Background Visual Ranges (BVRs) in the JTNP are approximately 112 miles, while the best 10 percent of summer BVRs in the JTNP are approximately 76 miles.

Figure 2-59

Median Daily Low Visibility by Five-Year Periods
(All qualifying days with relative humidity less than 70%)



SCAQMD, AQMP, July 1991, Technical Report V-6, Visibility Assessment for the SCAB, Chapter 2.

South Coast Air Basin. The South Coast Air Basin experiences some of the poorest visibility in California. The visibility problem in the SCAB is mostly due to the scattering and absorption of light by fine particulate in the air. Some of the particulate is emitted directly, as in the case of elemental carbon from diesel exhaust, and other components of the fine particulate are secondary aerosols formed from oxides of sulfur (sulfates), oxides of nitrogen (nitrates) and organic particulate (from emissions of reactive organic gases).

Visibility in the South Coast varies both hourly and seasonally. The major influence is the aerosol levels present, while water vapor from the ocean has a strong effect in coastal regions. Aerosol levels vary with the emission rates of combustion gases and the strength of sunlight heating the atmosphere. Generally, visibility is highest in the morning due to lower pollutant emission rates and lower formation rates of aerosols at

night. As the day progresses, emission rates increase with increasing traffic levels, and higher sun angles accelerate the production of aerosols. Maximum aerosol concentrations, and lowest visibilities, occur in mid-afternoon before lower angles of the sun reduce the aerosol production rates.

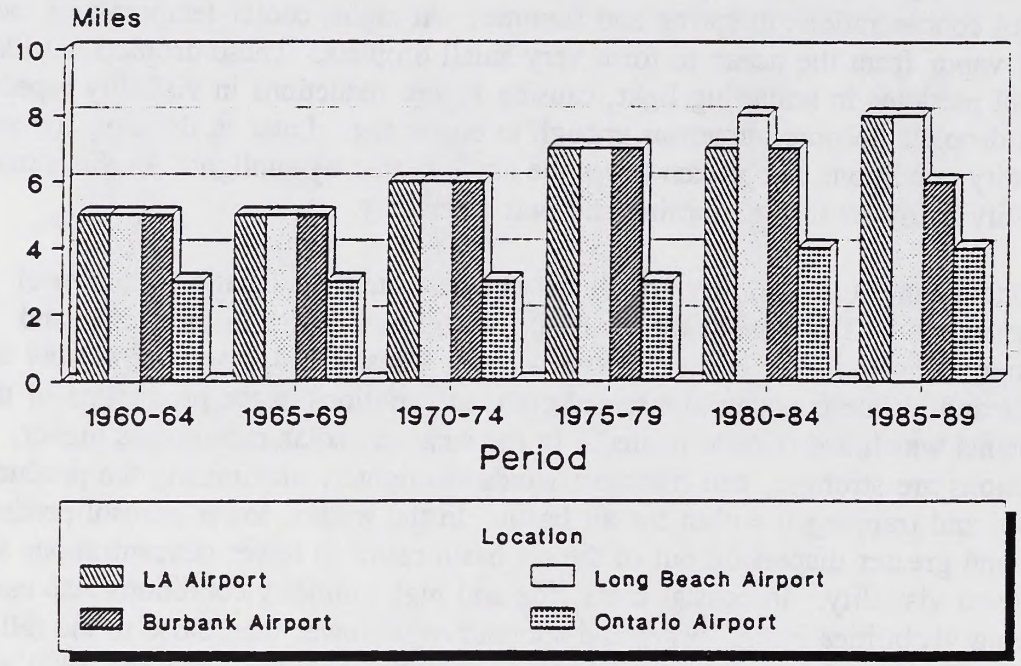
In coastal regions, water vapor levels generally have a greater effect on visibility than aerosol concentrations in spring and summer. At night, cooler temperatures cause water vapor from the ocean to form very small droplets. These droplets act like aerosol particles in scattering light, causing severe reductions in visibility especially when droplets become numerous enough to create fog. Later in the day, fog and high humidity conditions are broken up as the air is heated by sunlight. In this situation, visibility is lowest in the morning and best at midday.

Seasonal changes in visibility are almost entirely due to fluctuations in aerosol concentrations. Throughout the air basin, visibility is lower in the spring and summer, then improves in the fall and winter. These trends correlate closely with sulfate and nitrate concentrations, and point to variations in the production of these pollutants which are climate related. In the summer, solar radiation is higher, inversions are stronger, and transport winds are lighter, maximizing the production of aerosol and trapping it within the air basin. In the winter, lower aerosol production rates and greater dispersion out of the air basin result in lower concentrations and improved visibility. In coastal areas, fog and high humidity conditions also cause morning visibilities in the spring and summer to be lower than those in the fall and winter. For inland locations, median low visibilities between 1985 and 1989 were 2 to 2.5 times greater during winter than during summer.

Historically, visibility trends at downtown Los Angeles have varied in a cyclical fashion. During the early 1940s, a sharp deterioration occurred during the industrial expansion of the war years. As stationary source air pollution controls were imposed in the late 1940s, significant improvement was observed. A gradual deterioration in visibility during the mid-1950s was due to growth (especially in automobile traffic) outstripping stationary source controls. This trend was again reversed as automotive controls came into effect and stationary source controls were further tightened, causing visibility to slowly improve through 1986. The net result for the period 1958 to 1986 was moderate improvement in visibility for the coastal portion, and moderate or no improvement for the inland portion of the air basin. At Los Angeles and Long Beach Airports, median low visibilities have improved from 5 miles between 1965 to 1969 to 8 miles between 1984 and 1989. At Burbank Airport, median daily low visibilities improved from 5 miles between 1965 and 1969 to 7 miles between 1980 and 1984, then decreased to 6 miles between 1984 and 1989. At Ontario Airport, median daily low visibilities remained at 3 miles between 1960 and 1979, improving to 4 miles between 1980 and 1984, and remaining at 4 miles between 1984 and 1989. These trends are shown in Figure 2-60.

Figure 2-60

Median Daily Low Visibility, 1985-1989
Winter vs. Summer
(All qualifying days with relative humidity less than 70%)



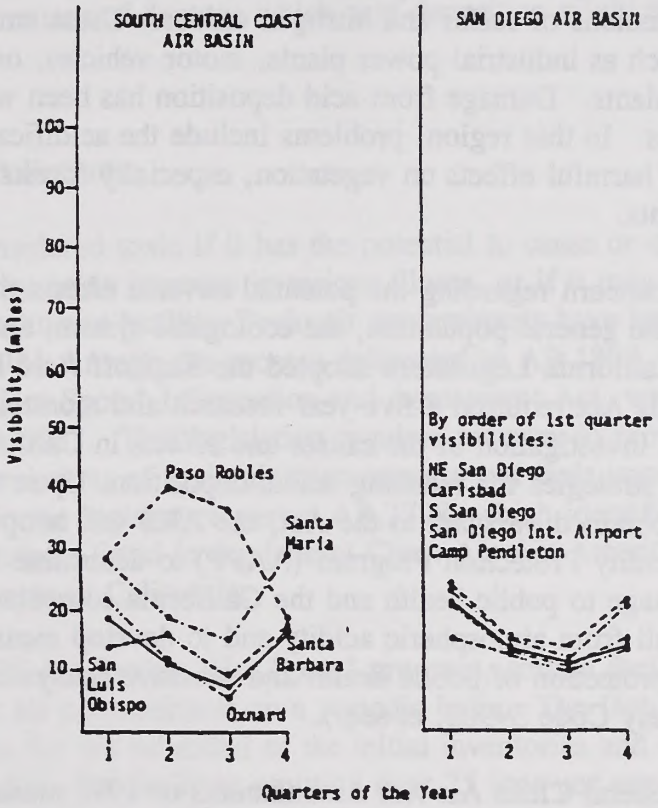
SCAQMD, AQMP, July 1991, Technical Report V-6, Visibility Assessment for the SCAB, Chapter 2.

South Central Coast Air Basin. The South Central Coast Air Basin experiences improving visibilities when viewed from west to east. Near the coastal areas at the western edge of the air basin, median visibilities average 14 miles; in the inland area of Paso Robles average visibilities approach 32 miles.

Visibility in the South Central Coast varies seasonally with the deeper penetration of fog near the coastal areas during spring and summer. This seasonal variability is shown in Figure 2-61. The data also indicate that the hourly variation in visibility near the coast has a pronounced pattern of an increase in visibility during the day as the sun "burns-off" the fog. The inland areas of the basin do not show as large a pattern of increasing visibility during the day due to lower changes in relative humidity in these areas.

Figure 2-61

Seasonal Patterns in California Visibility, 1974-1976
(median 1:00 PM values)



Trijonis, John, "Visibility in California Final Report," Technology Service Corporation, July 1980.

San Diego Air Basin. Between 1950 and 1966, the SDAB experienced approximately a 20% decline in visibility. The data for this period showed no pronounced seasonal changes in visibility; this suggests that air quality changes, rather than meteorological changes, were responsible for the visibility trends. However, as shown in Figure 2-59, the visibility data between 1974 and 1976 indicate that features typical to a coastal area now occur in San Diego: minimum visibility during the spring and summer, and maximum visibility during fall and winter. ARB studies indicate that the seasonal visibility pattern near the coastal areas of the San Diego Air Basin is closely tied to fog, relative humidity and the sulfate levels in the ambient air.

There is an improvement in visibility in the eastern direction (inland areas) of the basin. Near the San Diego coast, median visibilities average 13 miles; in the inland areas, east of San Diego in the Vellecito Mountains, median visibilities average between 45 and 70 miles.

2.5.2 Acid Deposition

Acid deposition occurs as a result of acid rain, acid fog, acid cloud water, acid snow, and dry deposition of both gases and particles. Examples of dry deposition include nitric acid vapors, organic acid vapors, and sulfuric acid mist. Acid deposition is a result of the emissions of sulfur and nitrogen oxides. These emissions may come from sources such as industrial power plants, motor vehicles, or chemical manufacturing plants. Damage from acid deposition has been widely investigated in the eastern states. In that region, problems include the acidification of lakes and streams and the harmful effects on vegetation, especially forests and grassland, from acid rain incidents.

Because of the concern regarding the potential adverse effects that acid deposition might have on the general population, the ecological system, and various man-made materials, the California Legislature adopted the Kapiloff Acid Deposition Act of 1982 (Act). This Act required a five-year research and monitoring program to review the problem, an investigation of the causes and effects in California, and the possible development of strategies for reducing acidic deposition. Upon the final compilation of information obtained pursuant to the Act, the ARB will adopt and implement an Atmospheric Acidity Protection Program (AAPP) to determine the nature and extent of potential damage to public health and the California ecosystem that may be expected to result from atmospheric acidity and to develop measures that may be needed for the protection of public health and sensitive ecosystems within the state (Health and Safety Code 39902, et seq.).

Similarly, the federal Clean Air Act Amendments of 1990 mandated that a nationwide program for the reduction in acid deposition (referred to as Title IV) be developed and adopted by EPA. In response to the mandate, EPA has adopted regulations that dictate a reduction in emissions of sulfur and nitrogen oxides from power plants.

California's acid deposition problems are different and less severe than those in the eastern United States. Chronically acidified lakes or streams have not been found in California. However, there are California lake watersheds in the high elevations of the Sierra Nevada that have low acid-neutralizing capacity and suffer from episodic, rather than chronic, acidification. In addition, because of its limited annual precipitation compared to the eastern states, California experiences less acid rain. Acid fog is more common in California and is typically 100 times more acidic than acid rain. In California, acid fog occurs in urban coastal areas and in the southern San Joaquin Valley. Dry deposition of gases and particles contribute to acid deposition in southern California. Urban coastal sites experience the most acidic deposition, both wet and dry, with nitric acid being the predominant acid of both forms.

Paints and building materials are also affected by acid deposition. Exposure of paints on building exteriors to acidic air pollution has resulted in discoloration. In the Los Angeles area, smog damages various materials. Because elevated concentrations of acidic air pollution occur with the presence of smog, other materials such as concrete and various metals (i.e., steel, nickel, aluminum) are currently being investigated to determine to what extent of damage which acid deposition might directly damage them.

2.5.3 Toxic Air Pollutants

A substance is considered toxic if it has the potential to cause or contribute to an increase in mortality or an increase in serious illness, or if it may pose a present or potential hazard to human health. Toxic air contaminants have been identified in California since 1984 through the process delineated in AB 1807. Assembly Bill 2588, the Toxic "Hot Spots" Information and Assessment Act, was enacted by the State legislature in 1987. This legislation requires industry to provide information to the public about emissions of toxic air contaminants and their impact on public health. In 1993, the California legislature passed AB 2728, which identifies the 189 federal hazardous air pollutants listed in the federal Clean Air Act Amendments of 1990 as toxic air contaminants in California.

Under the AB 2588 Air Toxics "Hot Spots" program, certain facilities report their emissions of toxic air contaminants on a periodic basis. The Hot Spots program phased in the dates for the submittal of the initial inventories and risk assessments: Phase 1, July 1, 1988, for facilities emitting over 25 tons per year of criteria pollutants; Phase 2, July 1, 1989, for facilities emitting between 10 tons and 25 tons per year of criteria pollutants; and Phase 3, July 1, 1990, for facilities emitting fewer than 10 tons of criteria pollutants. In addition, efforts are currently underway to characterize the emissions and health risks associated with small business area sources, such as gas stations and dry cleaners. Table 2-27 shows the estimated emissions of toxic air contaminants for the SCAB for Phase I facilities and facilities on the SCAQMD's list of toxic emitters, and a portion of the AB 2588 Phase II facilities.

Table 2-27 Emissions of Toxic Air Contaminants for the South Coast Air Basin		
SCAB Emissions (lb/yr)	Statewide Emissions (lb/yr)	Percent of Statewide Emissions in SCAB
67,561,626	132,184,362	51%

Source: SCAQMD, Staff Report, Proposed Amended Rule 1401, 1995. Emissions reported by AB 2588 Phase I facilities for reporting year 1989 and by some Phase II facilities for 1990. 1990 data are incomplete; they do not include all districts. All data are undergoing quality assurance checking and are subject to change.

Considering that assumptions and methodologies used to estimate risk levels may vary, the summary in Table 2-28 is provided as a general comparison of risks estimated for ambient toxic air contaminant levels in other areas of the United States.

Table 2-28 Estimated Lifetime Cancer Risk Due to Ambient Levels of Toxic Air Contaminants		
Study	Location	Estimated Lifetime Cancer Risk to An Individual
Six Months Study	Nationwide	340 to 520 in a million
Baltimore Geographic Study	Baltimore, MD	180 in a million
Santa Clara Geographic Study	Santa Clara, CA	60 to 420 in a million
Kanawha Geographic Study	Charleston, WV	500 to 1,260 in a million
Las Vegas Study	Las Vegas, NV	300 to 660 in a million
Five-City Controllability Study	5 Unidentified Cities	290 to 1,480 in a million
Minnesota Urban Cancer Risk Study	Minneapolis, MN	160 in a million

Source: SCAQMD, Staff Report, Proposed Amended Rule 1401, 1995; Lahre, 1988; Minnesota Pollution Control Agency, 1992.

A large reduction in air toxics emissions has occurred in California through the state's Toxic Air Contaminant Control Program (AB 1807). The regulations implemented under this program include the control of emissions from dry cleaners, cooling towers, chrome plating operations and ethylene oxide sterilizers. In upcoming years, another source of air toxic emission control will be implemented under Section 112, Hazardous Air Pollutants, of the 1990 Clean Air Act Amendments. Additionally, the federal and State gasoline standards that are scheduled to become effective in 1996 are expected to result in significant reductions in benzene and 1,4-butadiene emissions from motor vehicles. Motor vehicles, as a category, are the sources of toxic air contaminants that contribute most significantly to health risks in urban areas.

California's Proposition 65, the "Safe Drinking Water and Toxic Enforcement Act," does not directly control toxic air emissions, but it does require that warnings be

provided to the affected public if they are exposed to significant concentrations of substances listed by the Governor as causing cancer or reproductive toxicity. Nearly 370 substances and classes of chemicals have been listed as cancer-causing or as reproductive toxicants as of January 1, 1990. Starting twelve months after a chemical is listed by the Governor, a "clear and reasonable" warning must be provided to individuals that are exposed to the substance unless the exposure meets the "no significant risk" criterion. For substances that cause cancer, the "no significant risk" level is established as one excess case of cancer in an exposed population of 100,000, assuming a lifetime exposure. For reproductive toxicants, the "no significant risk level" is 1/1000 of the level at which no effects on test animals have been observed. Proposition 65 also prohibits discharges of the listed chemicals that pass into drinking water sources. An air emission may be prohibited if it "more likely than not" will pass into a drinking water source.

2.5.4 Interbasin Transport

The transport of air pollutants from one air basin to another occurs when there are winds of sufficient speed, duration, and direction. Both ozone and ozone precursors, including hydrocarbons and nitrogen oxides, may be transported. In addition, PM precursors, including organic, sulfate and nitrate aerosols, may be transported.

One of the difficulties in understanding air pollution transport in California is that there is significant variability in the geography and meteorology throughout the state. These characteristics vary from the cool, rainy areas of the north coast to the arid regions of the Mojave and Colorado Deserts in the southeastern portion of the state. Because of this great variability, the state has been subdivided into air basins, each of which comprises areas of similar meteorological and geographic conditions.

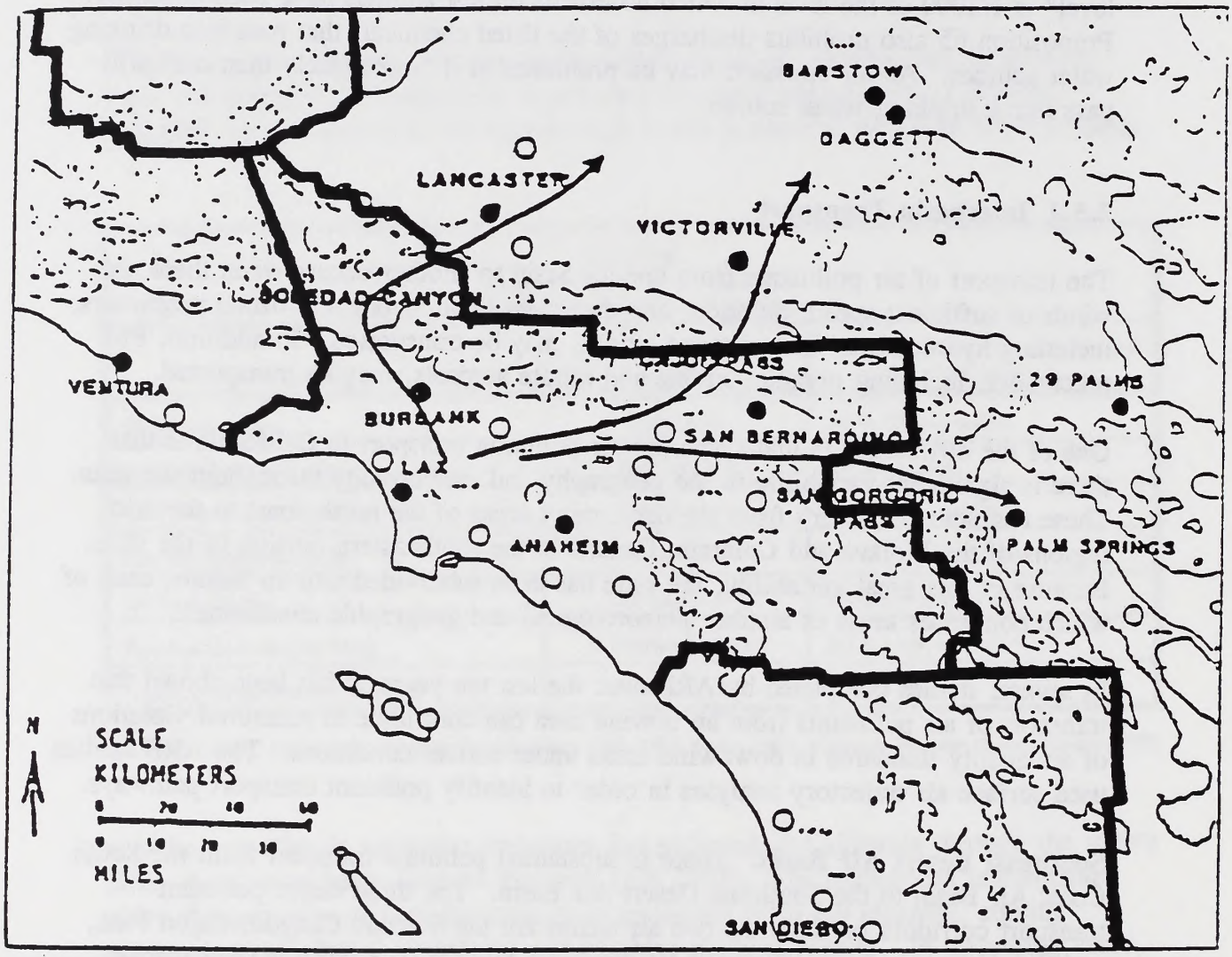
In several studies completed by ARB over the last ten years, it has been shown that transport of air pollutants from an upwind area can contribute to measured violations of air quality standards in downwind areas under certain conditions. The ARB studies used surface air trajectory analyses in order to identify pollutant transport pathways.

Southeast Desert Air Basin. There is substantial pollutant transport from the South Coast Air Basin to the Southeast Desert Air Basin. The three major pollutant transport corridors between the two air basins are the Soledad Canyon, Cajon Pass, and San Gorgonio Pass. Figure 2-62 illustrates these three pathways (reproduced from ARB's October 1989 staff report). The San Gorgonio Pass connects the Los Angeles Basin to the Colorado (Low) Desert. The wind through the pass is a constant current of air sweeping from the west to east. Based on the analyses of aerometric data from surface stations, balloon measurements, and aircraft measurements, several studies have concluded that the Low Desert is subject to the intrusion of pollution from the coastal area of Southern California. The Soledad Canyon and the Cajon Pass connect the High Desert to the Los Angeles Basin. The High Desert is the western portion of the Mojave Desert located north of the San Gabriel and San

Figure 2-62

Interbasin Transport Between South Coast and Southeast Desert Air Basins

(Soledad Canyon 3,300 ft; Cajon Pass 4,200 ft; San Gorgonio Pass 2,300 ft)



SCAQMD, AQMP for the Coachella Valley - San Jacinto Planning Area, Sept. 1994, Appendix I-B.

Bernardino Mountains. Tracer trajectory routes show that the northwest part of the South Coast Air Basin feeds into the Soledad Canyon while the southern part of the South Coast Air Basin feeds into the Cajon Pass.

In addition to transport from the South Coast Air Basin, several ARB studies also indicate that pollutant transport occurs from the San Joaquin Valley Air Basin to the Southeast Desert Air Basin. In the summertime, air frequently enters the San Joaquin Valley from the San Francisco Bay Area and flows in a southeasterly direction down the valley toward the Tehachapi Mountains. Some of this air and the pollution carried with it moves through the Tehachapi Pass into the Mojave Desert. ARB has concluded that the increased growth in the southern portion of the San Joaquin Valley will substantially impact the air quality in the Mojave Desert due to this transport corridor.

Finally, the ARB studies suggest that pollutant transport also occurs from Mexico into the Southeast Desert Air Basin. There have been pollutant exceedances reported at El Centro, less than 20 miles north of the Mexican border. The Mexicali area just over the border is growing rapidly. Prevailing summertime flow is across the border from south to north.

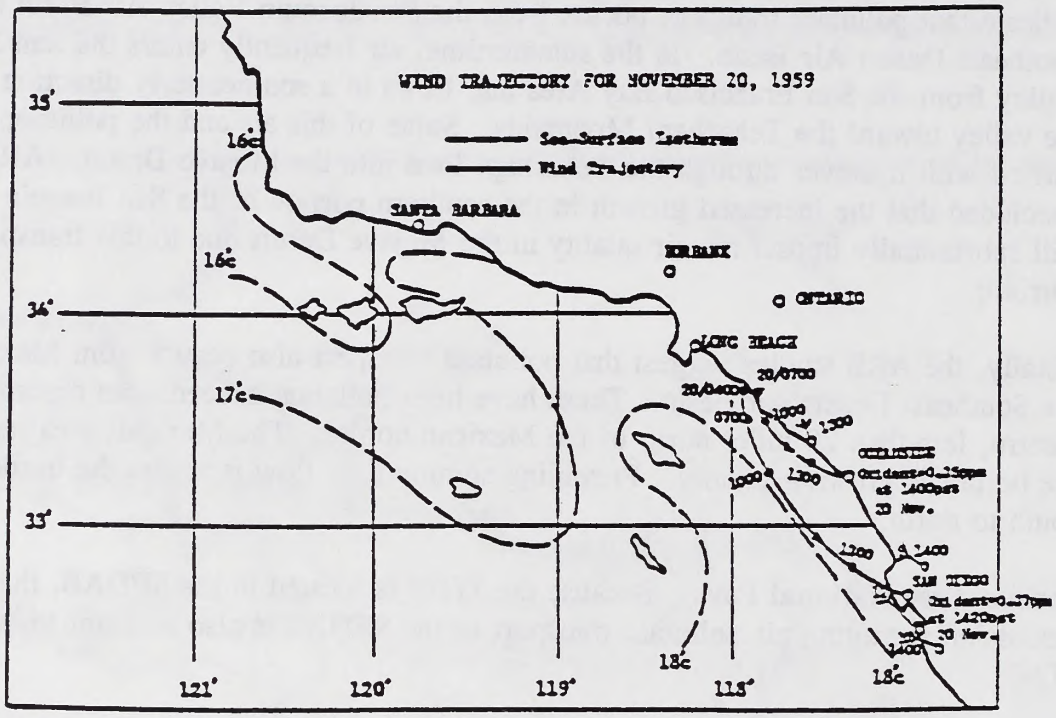
Joshua Tree National Park. Because the JTNP is located in the SEDAB, the above discussion regarding air pollutant transport to the SEDAB is also relevant to the JTNP.

South Coast Air Basin. Transport from the South Coast Air Basin to San Diego County can take place if northwesterly winds develop after contaminated air masses in the Los Angles Basin have moved to the coastal zone. The pollutants follow a pathway beginning off the coast of Los Angeles, extending southward along the coast, then crossing land again between the cities of Oceanside and San Diego. Not every instance of transport from the South Coast Air Basin to San Diego County causes a substantial air quality impact. Low inversions along the coast are necessary to concentrate the ozone and its precursors in the marine layer below the inversion. Two trajectories from the South Coast Air Basin to San Diego County are shown in Figure 2-63 (reproduced from ARB's staff report on identification of Districts affected by pollutant transport, dated October 1989).

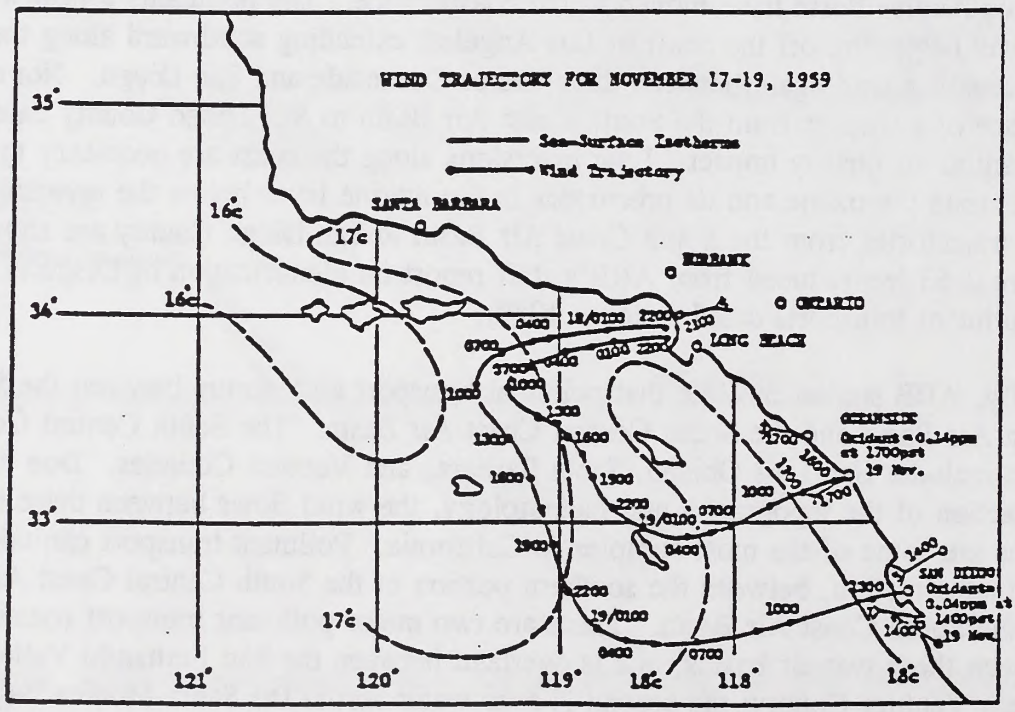
Finally, ARB studies indicate that pollutant transport also occurs between the South Coast Air Basin and the South Central Coast Air Basin. The South Central Coast Air Basin includes San Luis Obispo, Santa Barbara, and Ventura Counties. Due to the interaction of the topography and meteorology, the wind flows between these two air basins are some of the most complex in California. Pollutant transport can take place in either direction, between the southern portion of the South Central Coast Air Basin and the South Coast Air Basin. There are two major pollutant transport routes between these two air basins; one is overland between the San Fernando Valley and eastern Ventura County; the second is over water across the Santa Monica Bay.

Figure 2-63

Examples of Wind Trajectories



Sources: U.S. Weather Bureau and Scripps Institution of Oceanography



CARB, "Proposed Identification of Districts Affected by Transported Air Pollutants Which Contribute to Violation of the State Ambient Air Quality Standard for Ozone," October 1989.

South Central Coast Air Basin. As mentioned in the South Coast Air Basin section, transport can take place in either direction, between the southern zone of the South Central Coast Air Basin and the South Coast Air Basin, but significant transport is mostly from the South Coast Air Basin to the South Central Coast Air Basin. There are two major transport routes: one is overland between the San Fernando Valley and eastern Ventura County; the other is over water across the San Monica Bay.

Another source of transport to the South Central Coast is the transport of offshore emissions by the prevailing winds to this basin. This offshore area is defined by ARB as the California Coastal Waters (CCW). In most areas off the coast, the western boundary of the CCW is between 40 and 70 miles off the coast.

Finally, the ARB studies indicate that transport occurs from the San Joaquin Valley Air Basin to the San Luis Obispo County portion of the SCCAB. Transport generally occurs in the afternoon when winds from the SJVAB are strong enough to flow over the coastal range mountains. These transport winds are opposed by the surface sea breezes from the west which normally prevent the outflow winds from reaching the coast. When the sea breeze is weakened, the outflow from the valley is able to penetrate much further to the west. Transport from San Luis Obispo County to SJVAB has the potential to occur when opposing winds from the valley do not have enough strength to flow over the coastal range mountains; however, this is diminished when the sea breeze is weak. Currently, the ARB analysis indicates that transport from the San Luis Obispo County portion of the SCCAB to the SJVAB is "inconsequential" (ARB 1993).

San Diego Air Basin. Transport from the South Coast Air Basin to San Diego County occurs during weak offshore flows when winds from the Los Angeles Basin move to the coastal zone or a small distance offshore, and northwesterly winds subsequently develop. The ARB studies indicate this event occurs 23 percent of the time in winter, 17 percent of the time in spring, 14 percent of the time in summer, 21 percent of the time in fall, and 18 percent of the time on a yearly basis.

Finally, the ARB indicates that northerly winds across the Mexico border results in transport to the SDAB. The San Diego County coastal plain is a fairly narrow strip with no topographical barriers between it and the coastal plain across the international border in Baja California. Physically, the entire area is one air basin.

2.5.5. Global Warming

Global warming is the name given to the projected increase in worldwide average temperatures as a result of an increase in the "greenhouse effect," due to the increased concentration of carbon dioxide (CO_2) and several trace gases in the atmosphere. Like the glass in a greenhouse, these gases are transparent to visible light, but absorb energy transmitted to the infrared spectrum. Light from the sun is

thus transmitted through to the earth's surface, but infrared radiation from the earth's surface is absorbed near the atmosphere, rather than radiating back to space.

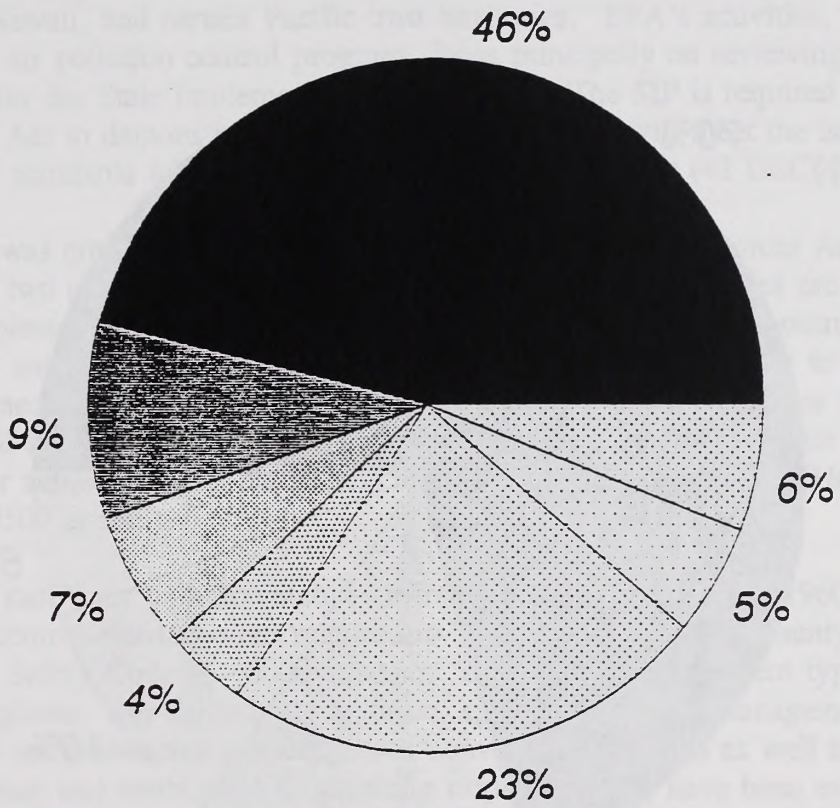
Although scientific opinion is not unanimous, several studies suggest that the increasing concentration of infrared absorbing gases in the atmosphere is likely to lead to a measurable increase in average global surface temperature by the middle of the next century. The impacts of this increase on California could include a decrease in water supplies, increased electric demand for cooling, a rise in ocean level which would imperil wetlands and shorelines, increased air pollution, and adverse impacts on California's economy.

Significant greenhouse gases in addition to CO_2 include methane, ozone, nitrous oxide, and various chlorofluorocarbon (CFC) species. Carbon monoxide (CO) and non-methane hydrocarbons (NMHC) are also important through their effects on atmospheric chemistry. These species react in the atmosphere to form ozone, and compete for OH radicals, which are responsible for degrading methane. Although nitrous oxide and the CFC species are present in the atmosphere in much smaller concentrations than CO_2, ozone, and methane, their infrared absorption per molecule is thousands of times greater, so that they have a major impact overall. One much-cited study by Ramanathan et al. projects a global temperature increase of 1.54°C, by 2030. The estimated contributions of various gases to this phenomenon are shown in Figure 2-64. The total warming due directly to the various CFC species was projected to be 0.36°C, with another increase of 0.08°C due to depletion of stratospheric ozone (also due to CFCs). The total CFC contribution is thus 0.44° C -- the second largest effect after CO_2, accounting for 29% of the projected warming.

A complete inventory of greenhouse gas emissions in California is not yet available. The California Energy Commission has estimated the breakdown of carbon emissions in California as shown in Figure 2-65. CFC emissions in California are also significant -- one estimate cited by the Energy Commission suggests that California emits 5% of total global CFC emissions. Major emissions of CFCs result from their use as cleaning solvents in the computer and aerospace industries, and as blowing agents in the production of foam insulation and packaging material. CFCs are also used extensively as working fluids in refrigeration and air-conditioning systems, but this does not result in their emission, except in the case of leakage, or when the systems are scrapped or recharged without salvaging the refrigerant.

Figure 2-64

Contribution of Greenhouse Gases to Global Temperature Change



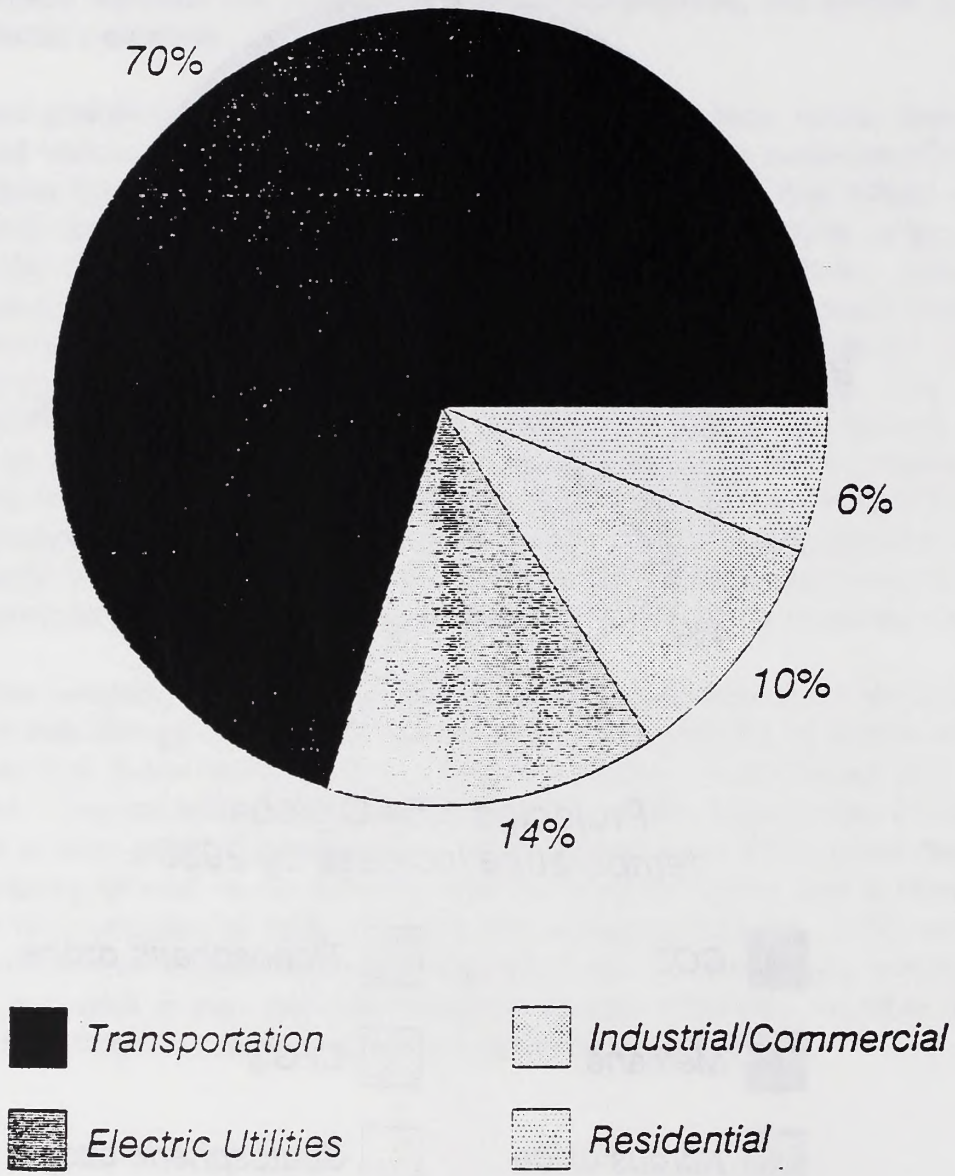
Projected 1.54°C global temperature increase by 2030

CO2
Methane
Nitrous oxide
Tropospheric ozone
CFC's
Stratospheric ozone
Other gases

V. Ramanathan, et al.
Trace Gas Trends and Their Potential Role in Climate Change
J. Geophys. Res., June 20, 1985.

Figure 2-65

Breakdown of Carbon Emissions in California



California Energy Commission
The Impacts of Global Warming: Interim Report
Sacramento, CA June 1989

2.6 Regulatory Setting

EPA has responsibility for enforcing, on a national basis, the requirements of many of the country's environmental and hazardous waste laws. California is under the jurisdiction of EPA Region IX, which has its offices in San Francisco. Region IX is responsible for the local administration of EPA programs for California, Arizona, Nevada, Hawaii, and certain Pacific trust territories. EPA's activities, by way of the California air pollution control program, focus principally on reviewing California's submittal for the State Implementation Plan (SIP). The SIP is required by the federal Clean Air Act to demonstrate how all areas of the state will meet the national ambient air quality standards within the federally specified deadlines (42 USC§§ 7409,7411).

The ARB was created in 1968 by the Mulford-Carrell Air Resources Act, through the merger of two other state agencies. ARB's primary responsibilities are to develop, adopt, implement, and enforce the state's motor vehicle pollution control program; to administer and coordinate the state's air pollution research program; to adopt and update as necessary the state's ambient air quality standards; to review the operations of the local air pollution control districts; and to review and coordinate preparation of the SIP for achievement of the federal ambient air quality standards (Health & Safety Code § 39500 et seq.).

When the state's air pollution statutes were reorganized in the mid-1960s, local air pollution control districts were required to be established in each county of the state (Health & Safety Code §§ 40000 et seq.). There are three different types of districts: county, regional, and unified. In addition, special air quality management districts, with more comprehensive authority over nonvehicular sources as well as transportation and other regional planning responsibilities, have been established by the Legislature for several regions in California, including the South Coast Air Quality Management District (SCAQMD) (Health & Safety Code §§ 40400 et seq.).

Air pollution control districts and air quality management districts in California have principal responsibility for developing plans for meeting the state and federal ambient air quality standards; for developing control measures for nonvehicular sources of air pollution necessary to achieve and maintain both state and federal air quality standards; for implementing permit programs established for the construction, modification, and operation of sources of air pollution; for enforcing air pollution statutes and regulations governing nonvehicular sources; and for developing employer-based trip reduction programs.

Each level of government has adopted specific regulations that limit stationary source emissions and many of these regulations may be applicable to the Eagle Mountain Landfill and Recycling Center. There are no specific air quality regulations applicable to the townsite development; however, some individual commercial facilities (e.g., dry cleaners, service stations) may be subject to source-specific rules.

2.6.1 Federal Prevention of Significant Deterioration Program

The U.S. EPA has promulgated Prevention of Significant Deterioration (PSD) regulations for areas that have achieved the National Ambient Air Quality Standards (attainment areas)allows new sources to be constructed or existing sources to be modified, while preserving the existing ambient air quality levels, protecting public health and welfare, and protecting Class I areas (e.g., national parks and wilderness areas).

The PSD requirements apply on a pollutant-specific basis to any project which is a new major stationary source or a major modification to an existing stationary source. (These terms are defined in federal regulations.) (40 CFR 52.21.) This determination is based on evaluating the emissions changes associated with the proposed project in addition to all other emissions changes at the same location over the last five years.

The five principal areas of the PSD program are as follows:

- Emissions must be controlled using Best Available Control Technology (BACT);

- Air quality impacts in combination with other increment consuming sources must not exceed maximum allowable incremental increases for NO_2, O_2, PM_{10} and CO.

- Air quality impacts of all sources in the area plus ambient pollutant background levels cannot exceed the NAAQS.

- Pre- and/or post-construction air quality monitoring may be required.

- The air quality impacts on soils, vegetation, and nearby PSD Class I areas (national parks and wilderness areas) must be evaluated. (Note: The facility site is within a Class II area, but is approximately 2.6 kilometers (1.5 miles from a Class I area, the Joshua Tree National Park).

The SCAQMD has applied for delegation of authority to implement the PSD program, however, this request has not yet been approved. The EPA expects to issue the PSD delegation to the SCAQMD in 1996. Hence, until the SCAQMD receives delegation, the PSD program will continue to be conducted by the EPA. A discussion of the proposed SCAQMD PSD Regulation is provided in Section 2.6.8.

2.6.2 Federal New Source Performance Standards

The Standards of Performance for New Stationary Sources are source-specific federal regulations, limiting the allowable emissions of criteria pollutants (i.e., those which have a National Ambient Air Quality Standard and their precursors) (40 CFR 60). These regulations apply to certain sources depending on the equipment size, process rate, and/or the date of construction, modification, or reconstruction of the affected facility. Recordkeeping, reporting and monitoring requirements are usually necessary for the regulated pollutant from each subject source; the reports must be regularly submitted to the reviewing agency. This program has been delegated by EPA to SCAQMD (40 CFR 60.4). The EPA recently amended the NSPS regulations, Subpart Cc and Subpart WWW, that apply to new and existing landfills. However, the South Coast Air Quality Management District has not received delegation of Subpart Cc and Subpart WWW of the New Source Performance Standards. A summary of the SCAQMD New Source Performance Standards applicable to the Project is provided in Section 2.6.8.

2.6.3. National Emissions Standards for Hazardous Air Pollutants

The National Emissions Standards for Hazardous Air Pollutants (NESHAPS) are either source-specific or pollutant-specific regulations, limiting the allowable emissions of hazardous air pollutants from the affected sources (40 CFR 61). Unlike criteria air pollutants, hazardous air pollutants are those that do not have a national ambient air quality standard but have been identified by EPA as causing or contributing to the adverse health effects of air pollution.

Administration of the hazardous air pollutants program has been delegated to the SCAQMD, and is described in Section 2.6.8.

2.6.4 Federal Clean Air Act Amendments of 1990

In November 1990, substantial revisions and updates to the federal Clean Air Act were signed into law. This complex enactment addresses a number of areas that could be relevant to the Eagle Mountain Landfill and Recycling Center, such as SIP requirements for nonattainment areas setting new compliance deadlines and annual progress increments, more extensive permitting requirements, new EPA mandates and deadlines for developing rules to control air toxic emissions, and acid deposition control. Provided below is a summary of the new provisions applicable to the Eagle Mountain facility.

Title V - Permits. This title establishes a comprehensive operating permit program for major stationary sources (42 USC §§ 7661 et seq.). Under the Title V program, a single permit that includes a listing of all the stationary sources, applicable regulations, and requirements is required. SCAQMD Regulation XXX, Title V

Permits, is expected to receive EPA approval for enforcement of the federal operating permit program. Consequently, SCAQMD is expected to receive authority to implement the Title V program. The SCAQMD Title V permit program applicable to the facility is summarized below in Section 2.6.8.

Title III - Hazardous Air Pollutants. This title establishes a program for regulating hazardous air pollutants from area source and industrial categories rather than concentrating on individual pollutants. EPA established a list of major source categories, such as chemical plants, oil refineries, and steel plants for the purpose of setting standards. Some 250 source categories will be regulated. The regulations will apply technology-based standards rather than risk-based standards. The SCAQMD has requested delegation of the Title III program under its request for delegation of Title V Permits.

2.6.5 Federal Conformity Requirements

The Clean Air Act (Section 176) required EPA to promulgate rules to ensure that federal actions conform to the appropriate State Implementation Plan. In 1993, EPA adopted regulations implementing Section 176 of the federal Clean Air Act, as amended (42 U.S.C. Sec 176). Under the EPA "general" conformity regulations, which pertain to actions not involving transportation or transit plans for projects (40 CFR Parts 6, 51 and 93, adopted November 15, 1993, and published at 58 FR 63214 et seq.), conformity requirements apply only to emissions impacts in areas that have been designated as either "nonattainment" or "maintenance" by EPA. This is further clarified in a recently signed highway bill (National Highway System Designation Act of 1995) which modifies the applicability definition of Section 176 so that it only applies to nonattainment and maintenance areas (i.e., not attainment areas). The question of whether a federal land transfer is subject to conformity for a project located in an attainment area, as well as the question of whether the project would satisfy the criteria if it were subject to the conformity requirements, are addressed in Part 5, Proposed Project, Section 5.5, Consistency with Regulatory Programs.

2.6.6 California Clean Air Act

AB 2595, the California Clean Air Act (Act) was enacted by the California Legislature and became law in January 1989. The Act requires the local air pollution control districts to attain and maintain the federal and state ambient air quality standards at the "earliest practicable date." The Act contains several milestones for the local districts and the ARB. SCAQMD submitted to ARB an air quality plan defining the program for meeting the required emission reduction milestones in the SCAQMD.

Air quality plans must demonstrate attainment of the state ambient air quality standards and, specifically, must result in a 5 percent annual reduction in emissions

of nonattainment pollutants (ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide) and their precursors in a given district (Health and Safety Code § 40914). In order to meet this requirement, a local district may adopt additional stationary source control measures or transportation control measures, revise existing source-specific or new source review rules, or expand its vehicle inspection and maintenance program (Health and Safety Code § 40918). District air quality plans specify the development and adoption of more stringent regulations to achieve the requirements of the Act. Those regulations that apply to the Eagle Mountain Landfill and Recycling Center are included in the discussion of SCAQMD prohibitory rules below.

2.6.7 SCAQMD New Source Review Requirements

SCAQMD Regulation XIII New Source Review (NSR), requires that a pre-construction review be conducted for all new or modified sources of air pollution. NSR contains three principal elements:

- Best Available Control Technology (BACT);
- emissions offsets; and
- air quality impact analysis.

BACT is required for all new emissions sources or modifications of existing sources if the project results in a net emissions increase of any nonattainment air contaminant, any ozone depleting compound, or ammonia

To ensure that there is no net increase in regional emissions, the SCAQMD NSR regulation requires that net emissions increases since October 1976 that were subject to NSR be offset. Offsets at a ratio of 1.2 to 1.0 must be provided, except for CO emissions and projects that are offset from the Priority Reserve at an offset ratio of 1.0 to 1.0.

The SCAQMD NSR regulation further requires an air quality impact analysis of NOx, CO and PM_{10} emissions, except sources below the threshold levels shown in Table 2-29.

Table 2-29 NSR Air Quality Impact Analysis Thresholds			
	NOx (lbs/hr)	CO (lbs/hr)	PM_{10} (lbs/hr)
Noncombustion Sources	0.068	3.7	0.41
Combustion Sources w/ Heat Input Capacity:			
2 MMbtu/hr	0.20	11.0	1.2
5 MMbtu/hr	0.31	17.1	1.9
10 MMbtu/hr	0.47	25.9	2.8
20 MMbtu/hr	0.86	47.3	5.2
30 MMbtu/hr	1.26	69.3	7.6
40 MMbtu/hr	1.31	72.1	7.9

In addition to the above requirements, the SCAQMD NSR regulation requires that a new or existing facility in SEDAB that emits 100 tpy, on a pollutant-specific basis, meet applicable EPA NSR requirements in 40 CFR, Part 51, Subpart I, Review of New Sources and Modifications.

On December 7, 1995, the SCAQMD Board amended Regulation XIII-New Source Review and Rule 212 - Standards for Approving Permits. Among the most significant changes are the following:

- The SCAQMD will implement an enhanced tracking system to account for all NSR increases, decreases, and related information. To provide equivalency with state and federal NSR requirements, the SCAQMD will offset accumulated emission increases from new or modified sources with creditable emission reductions achieved by various programs, including unclaimed credits from shutdowns and surplus rule reductions.

- An exemption for offsets was provided for new or modified facilities whose potential to emit does not exceed four tons per year for NOx, PM_{10}, SOx, and VOC and 29 tons per year for CO. This replaces the Community Bank.

- The definitions of "major polluting facility" and "major modification" were modified to reflect the fact that the SEDAB has a different attainment status than the SCAB.

- To encourage plant expansion and job creation, the requirement to offset any positive NSR balances first, before any new or modified source would be approved as part of the NSR process, was eliminated.

- The number of Emission Reduction Credit (ERC) trading zones was reduced from 38 to 2, consistent with the adopted provisions of Regulation XX - Reclaim.

Additional changes will be considered in March 1996, including a proposal to prohibit priority reserve offsets for private landfills and provisions dealing with requirements for a visibility analysis and Federal Land Manager notice.

SCAQMD Rule 1401 is the NSR program for new and modified sources of toxic air contaminants whose permit applications were submitted to the SCAQMD on or after June 1, 1990. The rule requires that a project not result in any of the following:

- a maximum individual cancer risk greater than one in one million at any receptor location, if the project is constructed without BACT for toxics;
- a maximum individual cancer risk greater than ten in one million at any receptor location, if BACT for toxics is applied; and
- greater than 0.5 excess cancer cases in the population subject to a risk of greater than one in one million.

Rule 1401 specifies the risk assessment procedures for determining the maximum expected cancer risk.

2.6.8 Other SCAQMD Regulatory Requirements

As required by the federal Clean Air Act, plans that demonstrate attainment must be developed for those areas that have not attained the National Ambient Air Quality Standards. As part of its plans, the SCAQMD has developed regulations limiting emissions from specific sources. These regulations are collectively known as "prohibitory rules," because they prohibit the construction or operation of a source of pollution that would violate specific emissions limits.

The general prohibitory regulations of SCAQMD that may be applicable to the Eagle Mountain Landfill and Recycling Center are summarized below.

Rule 53 - Riverside County -Specific Air Contaminants. This prohibitory rule was in effect before the SCAQMD was established and remains in effect. The rule prohibits SO_2 discharges in the west-central area greater than 0.05 percent by volume, calculated as SO_2. SO_2 discharges in all other portions not within the west-central area are limited to 0.15 percent by volume.

Rule 201 - Permit to Construct. This rule requires that a permit to construct be obtained from the SCAQMD prior to the construction of a source of air pollutants that is not otherwise exempted.

Rule 301 - Permit to Operate. This rule requires that a permit to operate be obtained from the SCAQMD to operate a source of air pollutants that is not otherwise exempted.

Rule 401 - Visible Emissions. This rule limits the visible emissions or opacity from the project to not darker than No. 1 when compared to a Ringlemann Chart for a period aggregating more than 3 minutes in any hour.

Rule 402 - Nuisance. This rule prohibits emissions in quantities that adversely affect public health, other businesses, or property.

Rule 403 - Fugitive Dust. This rule prohibits the emissions of fugitive dust from any active operation, open storage pile, or disturbed surface area such that the presence of such dust remains visible in the atmosphere beyond the project property line. The rule requires control measures to minimize dust emissions from each fugitive dust source type which is part of any active operation, and to prevent visible roadway dust from being deposited on public paved roadways. Further, a project must not cause or allow PM_{10} levels to exceed 50 ug/m^3. Additionally, the rule contains specific requirements for active operations that contain in excess of 100 acres of disturbed surface area, or any earth moving operation that exceeds a daily earth-moving volume of 10,000 cubic yards three times within a period of 365 consecutive days.

Rule 404 - Particulate Matter - Concentration. This rule limits the particulate emissions concentrations based on the volume of dry gas discharged from a source.

Rule 405 - Solid Particulate Matter - Weight. This rule limits the mass emissions rate of particulate matter from a source.

Rule 407 - Liquid and Gaseous Air Contaminants. This rule prohibits emissions of carbon monoxide and sulfur dioxide in excess of 2000 ppm and 500 ppm, respectively.

Rule 409 - Combustion Contaminants. This rule prohibits emissions from burning fuel in excess of 0.1 grain per cubic feet of exhaust gas volume at standard conditions.

Rule 431.1 - Sulfur Content of Gaseous Fuels. This rule limits the sulfur content of gaseous fuels used in stationary equipment requiring a permit to operate in the SCAQMD. On or after November 17, 1995, the sulfur content of landfill gas is limited to 150 ppm averaged on a daily basis. On or after July 1, 1997, landfill gas will be limited to 40 ppm averaged on a daily basis or as an alternative, a monthly averaging period at 40 ppm and a total sulfur cap of 200 ppm (at a 15-minute average), along with continuous monitoring to determine the total sulfur in the fuel gas, or total SOx from the stack.

Rule 461 - Gasoline Transfer and Dispensing. This rule requires that storage tanks and vehicle tanks used for gasoline transfer be equipped and operated with vapor recovery systems that have been certified by the ARB.

Rule 474 - Fuel-Burning Equipment - Oxides of Nitrogen. This rule limits the concentration of NOx emissions from non-mobile fuel-burning equipment based on maximum gross heat input rate.

Rule 481 - Spray Coating Operations. This rule specifies the equipment and application method to be used during spray coating.

Rule 1107 - Coating of Metal Parts and Products. This rule specifies the equipment and application method to be used during spray coating. Further, this rule prohibits the use of coatings that contain volatile organic compounds in excess of the limits specified in the rule by each metal coating type.

Rule 1150 - Excavation of Landfill Sites. This rule disallows the excavation of an active or inactive landfill without an Excavation Management Plan approved by the SCAQMD. Drilling of landfill gas collection wells does not require submittal of an Excavation Management Plan. Permits for these activities are not affected by requirements for an Environmental Management Plan.

Rule 1150.1 - Control of Gaseous Emissions from Active Landfills. This rule requires a landfill to operate under a landfill gas control system approved by the SCAQMD; this rule require the installation of a landfill gas collection system, gas disposal equipment, and soils vapor monitoring probes. Further, the rule limits the maximum concentration of organic compounds, on the surface of the landfill to 500 ppm or less.

Rule 1171 - Solvent Cleaning - Maintenance Activities. This rule limits the types of solvent that may be used for solvent cleaning activities. Further, the rule specifies the types of cleaning equipment and cleaning methods that can be used.

Regulation IX - New Source Performance Standards. SCAQMD has adopted by reference 40 CFR 60, Chapter I, Subpart OOO, the New Source Performance Standards (NSPS) for Non-Metallic Mineral Processing Plants. This regulation limits the discharge of particulate emissions; however, the SCAQMD NSR and source-specific rules will result in more stringent requirements.

Subpart WWW, Standards of Performance for Municipal Solid Waste Landfills, is an EPA regulation that requires subject landfills to install gas collection systems and then combust or process the captured gases. The regulation requires the submittal of semiannual reports to verify the proper design, installation, operation and monitoring of the gas collection and control system. The regulation is not more stringent than the SCAQMD BACT requirements.

Regulation X - National Emission Standards for Hazardous Air Pollutants (40 CFR 61, Chapter I). SCAQMD has adopted by reference the federal regulations for benzene, beryllium, mercury, vinyl chloride, asbestos and arsenic. These regulations are generally source-specific, e.g., standards that limit emissions of arsenic from glass manufacturing plants.

Regulation XVII - Prevention of Significant Deterioration. SCAQMD has applied for delegation of authority to implement the federal Prevention of Significant Deterioration (PSD) program. This authority has not yet been granted by EPA. According to discussions with EPA, this approval may be granted within the next few months. The discussion of this Regulation is provided as information.

The SCAQMD PSD Regulation would apply only to those pollutants for which the region is designated attainment or unclassified for federal air quality planning purposes. For SCAQMD, the five principal areas of its PSD program are the same as the Federal PSD program, these are:

- applicability;
- Best Available Control Technology (BACT);
- pre-construction monitoring;
- increments analysis; and
- air quality impact analysis.

The SCAQMD PSD regulation would apply, unless specifically exempted, to the preconstruction review for all permit units at a new or modified stationary source that:

- results in an increase in potential to emit of 25 or 40 tons (or 50 tons per year of NMOC from MSW landfills) of attainment air contaminants per year, depending on the source category; or

- results in a significant emission increase at an existing major stationary source (A major source is defined as one of 28 listed sources (including large power plants, Portland cement plants, and primary zinc smelters) that has the potential to emit 25 tons per year or more of any pollutant. Unlisted sources that have the potential to emit 40 tons per year or more of any pollutant are considered a major source.); or

- results in any net emission increase at a major stationary source located within 10 km of a Class I area, if the emission increase would impact the Class I area by 1.0 ug/m3, (24-hour average).

For subject facilities, Regulation XVII requires pre-construction monitoring unless it can be demonstrated by modeling that specific pollutant de minimis thresholds will not

be exceeded. Further, the Regulation requires that applicable facilities and projects demonstrate by modeling that the proposed source or modification, in conjunction with all other applicable emission increases or reductions (including secondary emissions) affecting the impact area, will not cause or contribute to a violation of 1) any National or State ambient air quality standard in any air quality region; or 2) any applicable maximum allowable concentration increase over the concentration of the pollutant that existed at the time of established baseline date.

Regulation XX - Regional Clean Air Incentives Market (RECLAIM). This regulation requires subject facilities to operate under an annual facility-wide emissions cap. Each year, this cap is decreased to match air quality planning requirements. To comply with annual emissions caps, subject facilities can either decrease emissions or purchase surplus emission reduction credits from other facilities.

Regulation XXX - Title V Permits. This regulation will implement the operating permit requirements of Title V of the federal Clean Air Act. This regulation will apply to Major Facilities, Phase II acid rain facilities, subject solid waste incinerator facilities, and any facility listed by EPA as requiring a Title V permit. If EPA does not grant SCAQMD implementing authority for Title V, EPA will review the Title V permit for the affected project.

2.6.9 South Coast Air Quality Management Plan

In 1994, the South Coast Air Quality Management District adopted a revised Air Quality Management Plan (AQMP) to identify specific emission reduction measures to comply with the 1990 federal Clean Air Act and the 1988 California Clean Air Act. The federal CAA requires the SCAQMD to develop a Federal Attainment Plan for ozone; a post-1996 Rate-of-Progress Plan; ozone attainment demonstrations for the Los Angeles county portion of the SEDAB (Antelope Valley) and the Riverside Nonattainment area of the SEDAB (Coachella - San Jacinto Planning Area); and a PM10 State Implementation Plan (SIP) which incorporates best available control measures for fugitive sources.

The California CAA requires the SCAQMD to address the following in its AQMP: application of Best Available Retrofit Control Technology; reduction of nonattainment pollutants and their precursors at a rate of 5 percent per year, or, if this cannot be done, inclusion of all feasible measures and expeditious implementation schedule; measures to achieve an average vehicle ridership during peak commute hours of 1.5 person per vehicle by 1999; ensure no net increase in mobile source emissions after 1997; measures to reduce population exposure to severe nonattainment pollutants (i.e., ozone, carbon monoxide, and nitrogen oxide) according to a prescribed

schedule; and a ranking of control measures by cost effectiveness and implementation priority.*

The 1994 AQMP proposes two tiers of emission reduction measures. Tier 1 is based on short- and intermediate-term measures using the application of available technology and practices between 1994 and 2005. These measures are designed to satisfy the federal Clean Air Act requirements of reasonable available control technology and the California CAA best available retrofit control technology.

To ultimately achieve ambient air quality standards, additional emissions reductions beyond the implementation of short- and intermediate-term measures will be necessary. Thus, the AQMP also includes Tier 2 measures. These long-term measures rely on the advancement of technologies and control methods that can reasonably be expected to occur between 1994 and 2010, including further development and refinement of low- and zero-emission control technologies in addition to technological breakthroughs.

---

* SCAG, 1994 Air Quality Management Plan, "Meeting the Clean Air Challenge."

PART 3
SIGNIFICANCE CRITERIA

3.1 Introduction

In attempting to evaluate the significance of air quality impacts of proposed projects, it is difficult to identify a single measure of significance. Some people believe that percentage changes are most critical, while others believe that changes in ambient concentrations are appropriate measures. Most air quality regulations are based on emissions, rather than ambient concentrations, due to uncertainties in the accuracy of modeling techniques that are available.

To assist in evaluating the air quality impacts associated with the project alternatives, various tools used by local, state and federal air quality agencies to determine whether a project's air quality impacts are significant have been identified. In addition, other significance measures that have been suggested are discussed.

Measures of significance for air quality impacts can generally be separated into three major categories:

- Those used for the evaluation of industrial sources of pollution, prior to issuing permits to construct or operate, or in evaluating the applicability of other permit program requirements;
- The limits of detection or reportability of ambient concentrations; or
- Measures used in areas with severe air quality problems.

Each of these categories will be discussed in more detail below.

3.2 Measures Used for the Evaluation of Industrial Sources

Industrial facilities in California are required to undergo an extensive air quality analysis, known as "new source review", prior to being granted approval for construction. The new source review programs in California are carried out by local air pollution control districts.

The federal Environmental Protection Agency has a parallel program, focusing on "clean air" areas of the country, known as the "prevention of significant deterioration" or PSD program.

In response to requirements in the federal Clean Air Act Amendments of 1990, state and local air pollution control agencies throughout the country are required to develop and implement operating permit programs that apply to major new and existing

industrial facilities. These new programs took effect in most states in mid-November 1995.

Finally, the South Coast Air Quality Management District (SCAQMD) has adopted several programs for new industrial sources of air pollution. Each of these programs contains a number of thresholds that trigger various requirements for project applicants. One could construe these triggers as assessments of the significance of a project's impacts, since a project with impacts below these levels is exempted from all (or a portion) of the review. These trigger levels are expressed either as emissions limitations (pounds per hour or tons per year), or as ambient concentrations (parts per million or micrograms per cubic meter).

3.3 Limits of Detection, Accuracy and Reportability

A second category of measures of significance has to do with the ability of regulatory agencies to detect changes in concentrations of pollutants in the ambient air. This ability is a function of the limits of detection and the accuracy of the analytical system. The limit of detection for most pollutants is extremely small. Advances in analytical technology allow lower and lower concentrations of pollutants to be measured. In general, the more serious constraint has to do with the accuracy of the measurements.

The California Air Resources Board (ARB) conducts periodic audits of the ambient air quality monitoring network throughout the state. ARB has established guidelines for the accuracy of these analyzers. If an analyzer is found to be operating outside of ARB's 10 percent limit for accuracy, an "advisory warning" is issued and a more thorough check is made of the analyzer's calibration data. If an analyzer is found to be operating outside of ARB's 15 percent limit for accuracy, the data collected by that analyzer are rejected unless the discrepancy can be explained and corrected.

In ARB's most recent published results* of its field audits, average accuracy estimates were provided for ambient monitors in California. While these accuracy tests were conducted at a variety of different concentrations, their use is most critical at or near the level of the ambient air quality standards. Consequently, one potential measure of "significance" for air quality impacts would be whether the difference in pollutant concentrations attributable to a project is larger than the accuracy of the average analyzer when determined at the level of the air quality standard for that pollutant.

A second, related measure has to do with the degree of precision to which ARB maintains and reports ambient air quality concentrations. ARB selects its reporting precision based on a subjective evaluation of the precision of the analyzers, the accuracy of the analyzers, and the level of precision to which the ambient air quality

---

* 1994 ARB Data Accuracy Estimates, Air Resources Board, Memorandum from Warren Crecy to Alice Westerinen, dated August 15, 1995.

standard is expressed. Thus, another measure of significance of air quality impacts would be whether the difference in pollutant concentrations attributable to a project would change a number reported by ARB.

3.4 Measures Used in Areas with Severe Air Quality Problems

One final measure that has been suggested for use in areas with particularly difficult air quality problems is known as "the one molecule theory." Under this approach, it is assumed that the existing air quality problem in a region is so severe that any increase in emissions or pollutant concentrations, even just one molecule more, would constitute a significant increase. The purpose of this approach is generally to require mitigation of all projects that would result in any increase in emissions.

However, this approach tends to break down when evaluating the impacts of extremely small projects. For example, the addition of a stop sign at a traffic intersection will result in a small increase in emissions (and localized concentrations) of carbon monoxide. While there may be mitigation measures available that could reduce carbon monoxide emissions at another nearby location, there will always be an increase of at least one molecule of carbon monoxide right where the new stop sign is located. Under this example, if the one molecule theory were rigorously applied, one would have to conclude that the addition of the stop sign resulted in a significant impact and that this significant impact could not be mitigated.

Another application of the one molecule theory is to use it to determine whether mitigation should be required for a project in areas with severe air quality problems, but then to rely on other measures of significance (or simply professional judgment) to evaluate the benefits of the mitigation measures.

A summary of the available measures of significance for each pollutant is shown in Tables 3-1 to 3-5.

Table 3-1
Measures of Significance for Carbon Monoxide

Agency	Level	Abbreviation	Comment
Emissions-Based Measures - Industrial Sources			
So. Coast AQMD	100 tons/year	AQMD major source	definition of major polluting facility
So. Coast AQMD	100 tons/year	AQMD major modification	definition of major modification
So. Coast AQMD	0 lbs/day	AQMD BACT	level above which BACT is required
So. Coast AQMD	29 tons/year	AQMD Offsets	level above which offsets are required
So. Coast AQMD	550 lbs/day	AQMD CEQA	project significance level
So. Coast AQMD	25 tons/year	AQMD major PSD	definition of major stationary source
So. Coast AQMD	25 tons/year	AQMD sig incr PSD	definition of significant increase
EPA	100 tons/year	EPA major source	definition of major stationary source
EPA	100 tons/year	EPA major modification	definition of major modification
Concentration-Based Measures - Industrial Sources			
So. Coast AQMD	1 ppm (1-hr) 1.1 mg/m^3 0.45 ppm (8-hr) 0.50 mg/m^3	AQMD modeling	significant increase in ambient concentration
EPA	575 μg/m^3 (8-hr)	EPA de minimis (8-hr)	level below which ambient monitoring is not required
EPA	500 μg/m^3 (8-hr)	EPA significant (8-hr)	definition of a significant air quality impact
EPA	2000 μg/m^3 (1-hr)	EPA significant (1-hr)	definition of a significant air quality impact
Measurement Accuracy and Reporting Precision			
ARB	0.27 ppm (1-hr)	ARB accuracy (1-hr)	ARB measured accuracy of 1.37 percent times 20 ppm standard
ARB	1 ppm (1-hr)	ARB report (1-hr)	precision to which ARB reports concentrations
ARB	0.1 ppm (8-hr)	ARB report (8-hr)	precision to which ARB reports concentrations

Table 3-2
Measures of Significance for Hydrocarbons/Oxides of Nitrogen/Ozone

Agency	Level	Abbreviation	Comment
Hydrocarbon and NOx Emissions-Based Measures - Industrial Sources			
So. Coast AQMD	25 tons/year	AQMD major source	definition of major polluting facility
So. Coast AQMD	25 tons/year	AQMD major modification	definition of a major modification
So. Coast AQMD	0 lbs/day	AQMD BACT	level above which BACT is required
So. Coast AQMD	4 tons/year	AQMD offsets	level above which offsets are required
So. Coast AQMD	55 lbs/day	AQMD CEQA	project significance level
So. Coast AQMD	25 tons/year	AQMD major PSD	definition of major stationary source
So. Coast AQMD	25 tons/year	AQMD sig incr PSD	definition of significant increase
EPA	100 tons/year	EPA major source	definition of major stationary source
EPA	40 tons/year (VOC)	EPA major modification	definition of major modification
EPA	50 tons/year (NMOC)	EPA major modification	definition of major modification
Ozone Concentration-Based Measures - Industrial Sources			
None			
Ozone Measurement Accuracy and Reporting Precision			
ARB	0.10 pphm	ARB accuracy	ARB measured accuracy of 1.08 percent times 9 pphm standard
ARB	1 pphm	ARB reporting	precision to which ARB reports concentrations

Table 3-3
Measures of Significance for Oxides of Nitrogen

Agency	Level	Abbreviation	Comment
Emissions-Based Measures - Industrial Sources			
So. Coast AQMD	25 tons/year	AQMD major source	definition of major polluting facility
So. Coast AQMD	25 tons/year	AQMD major modification	definition of a major modification
So. Coast AQMD	0 lbs/day	AQMD BACT	level above which BACT is required
So. Coast AQMD	4 tons/year	AQMD offsets	level above which offsets are required
So. Coast AQMD	55 lbs/day	AQMD CEQA	project significance level
So. Coast AQMD	25 tons/year	AQMD major PSD	definition of major stationary source
So. Coast AQMD	25 tons/year	AQMD sig incr PSD	definition of significant increase
So. Coast AQMD	4 tons/yr	RECLAIM	applicability threshold
EPA	100 tons/year	EPA major source	definition of major stationary source
EPA	40 tons/year	EPA major modification	definition of major modification
Concentration-Based Measures - Industrial Sources			
So. Coast AQMD	20 $\mu g/m^3$ (1-hr)	AQMD modeling	significant increase in ambient concentration
So. Coast AQMD/ EPA	2.5 $\mu g/m^3$ Ann	Class I annual	allowable increment: Class I areas
So. Coast AQMD/ EPA	25 $\mu g/m^3$ Ann	Class II annual	allowable increment: Class II areas
EPA	14 $\mu g/m^3$ ann	EPA de minimis annual	level below which ambient monitoring is not required
EPA	1 $\mu g/m^3$ ann	EPA sig annual	significant air quality impact

Table 3-3 Measures of Significance for Oxides of Nitrogen			
Agency	Level	Abbreviation	Comment
Measurement Accuracy and Reporting Precision			
ARB	0.19 pphm (1-hr)	ARB accuracy (1 -hr)	ARB measured accuracy of 0.76 percent times 25 pphm standard
ARB	1 pphm (1-hr)	ARB reporting (1-hr)	precision to which ARB reports concentrations
ARB	0.1 pphm ann	ARB report ann	precision to which ARB reports concentrations

Table 3-4 Measures of Significance for Sulfur Dioxide			
Agency	Level	Abbreviation	Comment
Emissions-Based Measures - Industrial Sources			
So. Coast AQMD/ EPA	100 tons/year	major source	definition of major polluting facility
So. Coast AQMD/ EPA	40 tons/year	major modification	definition of a major modification
So. Coast AQMD	0 lbs/day	AQMD BACT	level above which BACT is required
So. Coast AQMD	4 tons/year	AQMD offsets	level above which offsets are required
So. Coast AQMD	150 lbs/day	AQMD CEQA	project significance level
So. Coast AQMD	25 tons/year	AQMD major PSD	definition of major stationary source
So. Coast AQMD	25 tons/year	AQMD sig incr PSD	definition of significant increase
So. Coast AQMD	4 tons/yr	RECLAIM	applicability threshold

Table 3-4
Measures of Significance for Sulfur Dioxide

Agency	Level	Abbreviation	Comment
Concentration-Based Measures - Industrial Sources			
So. Coast AQMD/ EPA	2 $\mu g/m^3$ Ann 5 $\mu g/m^3$ (24-hr) 25 $\mu g/m^3$ (3-hr)	Class I annual	allowable increments for Class I areas
So. Coast AQMD	1 $\mu g/m^3$ (24-hr)	AQMD modeling	significant increase in ambient concentration
So. Coast AQMD/ EPA	2 $\mu g/m^3$ Ann 91 $\mu g/m^3$ (24-hr) 512 $\mu g/m^3$ (3-hr)	Class II annual	allowable increments for Class II areas
EPA	13 $\mu g/m^3$ (24-hr)	EPA de minimis (24-hr)	level below which ambient monitoring is not required
EPA	1 $\mu g/m^3$ ann	EPA sig annual	definition of a significant air quality impact
EPA	5 $\mu g/m^3$ (24-hr)	EPA sig (24-hr)	definition of a significant air quality impact
EPA	25 $\mu g/m^3$ (3-hr)	EPA sig (3-hr)	definition of a significant air quality impact
Measurement Accuracy and Reporting Precision			
ARB	0.08 pphm (1-hr)	ARB accuracy (1 -hr)	ARB measured accuracy of 0.31 percent times 25 pphm standard
ARB	1 pphm (1-hr)	ARB reporting (1-hr)	precision to which ARB reports concentrations

Table 3-5
Measures of Significance for Fine Particulates (PM_{10})

Agency	Level	Abbreviation	Comment
Emissions-Based Measures - Industrial Sources			
So. Coast AQMD	70 tons/year	AQMD major source	definition of major polluting facility
So. Coast AQMD/ EPA	15 tons/year	AQMD major modification	definition of a major modification
So. Coast AQMD	0 lbs/day	AQMD BACT	level above which BACT is required
So. Coast AQMD	4 tons/year	AQMD offsets	level above which offsets are required
So. Coast AQMD	150 lbs/day	AQMD CEQA	project significance level
So. Coast AQMD	25 tons/year	AQMD major PSD	definition of major stationary source
So. Coast AQMD	15 tons/year	AQMD sig incr PSD	definition of significant increase
EPA	100 tons/year	EPA major source	definition of major stationary source
Concentration-Based Measures - Industrial Sources			
So. Coast AQMD	1 $\mu g/m^3$ AGM	AQMD modeling	significant increase in air quality
So. Coast AQMD	5 $\mu g/m^3$ AGM 10 $\mu g/m^3$ (24-hr)	AQMD Class I	allowable increments for Class I areas
So. Coast AQMD	19 $\mu g/m^3$ AGM 37 $\mu g/m^3$ (24-hr)	AQMD Class II	allowable increments for Class II areas
EPA	4 $\mu g/m^3$ ann 8 $\mu g/m^3$ (24-hr)	EPA Class I	allowable increments for class I areas (parks)
EPA	17 $\mu g/m^3$ (24-hr) 30 $\mu g/m^3$ (24-hr)	EPA Class II	allowable increments for Class II areas
EPA	10 $\mu g/m^3$ (24-hr)	EPA de minimis (24-hr)	level below which ambient monitoring is not required
EPA	1 $\mu g/m^3$ ann	EPA sig annual	definition of a significant air quality impact
EPA	5 $\mu g/m^3$ (24-hr)	EPA sig (24-hr)	definition of a significant air quality impact

Table 3-5 Measures of Significance for Fine Particulates (PM_{10})			
Agency	Level	Abbreviation	Comment
Measurement Accuracy and Reporting Precision			
ARB	0.21 $\mu g/m^3$ (24-hr)	ARB accuracy (24-hr)	ARB measured accuracy of 0.41 percent times 50 $\mu g/m^3$ standard
ARB	1 $\mu g/m^3$ (24-hr)	ARB reporting (24-hr)	precision to which ARB reports concentrations
ARB	0.1 $\mu g/m^3$ ann	ARB reporting ann	precision to which ARB reports concentrations

3.5 Measures Used for Visibility Protection

The federal visibility program established by the Clean Air Act (Section 169A) declares a national goal of preventing and remedying visibility impairment in mandatory Class I areas caused by manmade air pollution. Under this program, the Joshua Tree National Park has been identified by the EPA as a Class I area where visibility is an important value. Two programs under the Act specifically address visibility in national parks and wilderness areas: the PSD program, and the visibility program.

The PSD program is directed primarily at new sources and the visibility program is aimed primarily at existing sources. The PSD program, which is discussed in more detail in Part 2, requires best available control technology (BACT) on new or modified major sources to minimize additional air pollution. An applicant must also demonstrate that the proposed new or expanded source will comply with air-quality "increments" that limit increases in air pollution. These increments specify the maximum permissible cumulative increases of several pollutants over the pre-existing baseline concentrations in each clean-air area (areas that meet the ambient air quality standards). The PSD program includes a special air quality related values (AQRV) test for evaluating major emitting facility that might affect a Class I area.

The visibility program declares a national goal of preventing and remedying visibility impairment in mandatory Class I areas. States are required to develop a long-term strategy for making reasonable progress toward the visibility goal. In addition, the states are to require the installation of best available retrofit technology (BART) on any major source placed into operation after August 7, 1962, if that source "emits any air pollutant which may reasonable be anticipated to cause or contribute to any impairment of visibility" in a listed mandatory Class I area.

The criteria for assessments of individual sources are defined in the EPA Workbook for Plume Visual Impact Screening and Analysis (Revised), dated October 1992. In this workbook, criteria are identified that can be used to determine if a source might impair visibility in parks. These criteria are based on the contrast between the plume and its surroundings. To address the dimension of color as well as brightness, a color contrast parameter, ΔE, and a contrast value are used as the primary bases for determining the perceptibility of plume visual impacts in screening analyses. For bright viewing objects, a contrast of 0.05 translates to a ΔE of approximately two. The literature suggests an upper, best estimate and lower threshold for perceptibility. The lower threshold is based on the use of laboratory-derived estimates of perceptibility thresholds as screening criteria; whereas in the natural environment, the upper threshold recognizes that the observer in the field is likely to be much less sensitive to contrast and color difference. Table 3-6 suggests the range and the best-estimate threshold based on the current understanding of perceptibility.

Table 3-6
Measures of Significance for Visibility

Agency	Level	Abbreviation	Comment
EPA	ΔE = 2.0 Contrast = 0.05	EPA Lower-Bound Threshold	screening threshold for Level-1 and Level-2 screening
EPA	ΔE = 1.0 to 4.0 Contrast = 0.025 to 0.10	EPA Best-Estimate Threshold	approximate threshold of plume perceptibility
EPA	ΔE = 4.0 Contrast = 0.10	EPA Upper-Bound Threshold	detection of slight discoloration by most people (probability of 90 percent detection with high contrast background)

Ref. Information from Workbook for Plume Visual Impact Screening and Analysis, October 1992, EPA

PART 4
PROPOSED PROJECT

4.1 Introduction

Emissions from the Proposed Project will be associated with a number of activities. These include both stationary sources, such as landfill gas flares, and mobile equipment, such as the trains hauling waste. By emission type, project sources can be grouped into four classes: motor vehicles, fugitive dust sources, fugitive vapor sources, and stationary combustion sources. Motor vehicles include train locomotives, on-highway haul trucks, and off-highway equipment; fugitive dust sources include short-term construction activities, landfill road use, mine tailing reclamation, and solid waste covering; fugitive vapor sources include the landfill surface, landfill fuel storage tanks and leachate/condensate tanks; and stationary combustion sources include the landfill gas flares.

Motor vehicles will generate "tailpipe" emissions and, in the case of on-site vehicles, fugitive dust from paved and unpaved road use. Fugitive dust will also be generated during the processing and handling of cover and liner as overburden and tailings are reclaimed by screening and crushing. As the previously landfilled refuse begins to decompose, gas will be generated by the anaerobic activity in the landfill. The gas will consist primarily of methane and carbon dioxide with trace concentrations of other substances either produced by the bacterial activity or evaporated from materials disposed of in the landfill. The gas will be collected through a series of extraction wells and will be disposed of by flaring. The burning of the landfill gas in flares will result in combustion emissions. Each of these sources is discussed in more detail below.

The townsite development will result in additional emissions from motor vehicles, residential area sources (such as space and water heaters), and commercial activities (such as space and water heating, dry cleaners, service stations, etc.).

Each of these sources is discussed in more detail below.

Although Material Recovery Facilities (MRFs) and Transfer Stations (TSs) are not part of the Proposed Project, they are discussed in Attachment A (Section A-1), to provide context for the general waste management process. Estimates of emissions generated at the MRFs/TSs are also included in Attachment A.

4.2 Emissions - Initial Construction

Emissions during the initial construction of the Proposed Project are discussed in detail in Attachment B. The initial construction of the Proposed Project is divided into five main construction projects:

- Improvement/extension of the existing Eagle Mountain Road
- Construction of the Phase I intermodal rail/truck marshaling yard including refurbishing existing warehouse and shop facilities
- Reconstruction of the existing Eagle Mountain rail line
- Preparation of the first phase of the landfill
- Townsite improvements

The initial construction period will take approximately nine months. Each year additional liner systems will be constructed, which will require a time period of about two to three months. The maximum emissions will occur when all five of the initial construction projects are active simultaneously.

Fugitive emissions from the initial construction of the Proposed Project will result from (1) dust entrained during excavation and grading at the construction sites; (2) dust entrained during travel on unpaved haul roads and across unpaved construction sites; (3) dust entrained during aggregate and soil loading and unloading operations; (4) dust entrained from raw material transfer at the portable asphalt and concrete batch plants; and (5) wind erosion of areas disturbed during construction activities. Equipment exhaust emissions will result from (1) exhaust from the heavy-duty Diesel equipment used for excavation and construction; (2) exhaust from the water trucks used to control construction dust emissions; (3) exhaust from Diesel generators located at the temporary asphalt and concrete batch plants; and (4) exhaust from heaters located at the temporary asphalt plant. A detailed discussion of the emissions associated with the initial construction of the Proposed Project is included in Attachment B.

4.3 Emissions - Operation

4.3.1 Solid Waste Transport

Solid waste will be transported to Eagle Mountain by two modes: trains and trucks. Approximately 90% of the waste will be transported by train, primarily from the Los Angeles basin, although waste will also be transported by train from parts of Ventura, Santa Barbara, and San Diego Counties. The remainder of the waste will be hauled primarily from Riverside County by truck. Waste will arrive at the landfill site in 20 to 25-ton containers compacted at MRF/TS sites. Both transportation modes will produce exhaust emissions from the combustion of Diesel fuel in internal combustion engines.

Waste processed at MRFs/TSs will be transported in unit trains over Southern Pacific and Eagle Mountain track. Typically a train will consist of 70 articulated cars, each capable of carrying 2 containers. Southern Pacific will pick up the loaded cars at MRF/TS sites and ferry them to a siding near Ferrum Junction, where the Eagle Mountain spur line intersects. Eagle Mountain engines will hook up to the unit trains at Ferrum Junction and transport them to the container handling yards at the landfill facility. Alternatively, the same Southern Pacific locomotives will transport trains to the site. Diesel locomotive emissions vary proportionately with fuel consumption. Fuel consumption is dependent upon the weight of the train being pulled and the vertical grade of the track. Because the MRF/TS-to-landfill route carries trains over two passes, fuel consumption and emissions are not constant over each section of the route. Therefore, separate fuel consumption estimates were generated for flat and inclined portions of the route. A summary of fuel use and emissions for portions of the route operated by the two carriers is shown in Attachment A. Based on a maximum expected daily train waste haul rate of 18,000 tons, the Proposed Project includes 5 to 6 train round-trip deliveries per day depending on the amount of waste hauled per train.

An estimated 10% (2,000 tons per day) of waste will be transported to the project site by on-highway trucks. It is anticipated that within 75-150 miles driving distance from the project, the cost of transporting solid waste in containers from MRFs/TSs using tractor-trailers will be less expensive than shipping it by rail. As a result, the Proposed Project will generate up to 100 truck round-trips to the project site per day with 20 ton loads. An analysis of the emissions from this activity, calculated at an average maximum daily round-trip distance of 225 miles per truck, appears in Table 4-1 with detailed emission calculations included in Attachment A. The gram/mile emission factors were taken from EMFAC7F. The average factors in EMFAC7F for heavy-duty vehicles understate the gram per mile emissions from the large [Class 8B, gross vehicle weight ratings (GVWR) greater than 60,000 pounds] trucks that will be used in this project. Consequently, truck emission factors were adjusted to account for the greater emissions per mile of the Class 8B trucks. Emission factors for the year 2000 were used in these estimates.

4.3.2 On-Site Material Handling (Except Fugitive Dust)

As a category, on-site heavy equipment is the largest source of gaseous emissions on the project site. A significant portion of these emissions is associated with the fleet of hostling vehicles which will haul containers from the intermodal rail/truck marshaling yards to the landfill face, while the remainder is distributed among other general categories of operations. The emissions for equipment grouped within these categories are summarized in Table 4-1; detailed calculations are included in Attachment A.

At the peak of landfill activity, hostling vehicles will be in almost constant motion. The disposal of 20,000 tons of solid waste in 20-25 ton containers will require

Table 4-1
Total Project Emissions
Proposed Project Without Mitigation

Activity	(lbs/day) NOx	CO	PM10	VOC	SO2	(tons/yr) NOx	CO	PM10	VOC	SO2
Offsite Sources										
Trains	11,761	1,673	264	527	889	2,146	305	48	96	162
On-Highway Trucks	940	451	127	94	26	172	82	23	17	5
Subtotal, Offsite	12,701	2,124	391	621	915	2,318	387	71	113	167
Onsite Sources										
Trains	220	90	7	39	24	40	16	1	7	4
On-Highway Trucks	48	7	3	6	1	9	1	1	1	0
Townsite	98	1,022	8	83	8	18	187	2	15	1
Onsite Vehicle Exhaust	3,020	521	173	156	95	551	95	32	29	17
Onsite Fugitive Dust			560					102		
Landfill Gas Flares	1,264	903	803	368	468	231	165	147	67	85
Fugitive Landfill Gas				311					57	
Maintenance Shop			1	12				0	2	
Emergency Generators	4	29	0	0	0	0	1	0	0	0
Fuel Storage Tanks				2					0	
Leachate/Condensate Tanks				0					0	
Locomotive Sand Silo			0					0		
Subtotal, Onsite	4,654	2,573	1,554	978	595	849	465	284	178	109
PROJECT T[illegible]L	17,355	4,697	1,9[illegible]	1,599	1,510	3,167	852	355	[illegible]	276

800-1000 round-trips by the hostling vehicle fleet each day between the intermodal rail and truck marshaling yards and the active face of the landfill. In the intermodal rail yards, overhead cranes will also operate continuously during peak periods. Cranes will transfer loaded waste containers from rail cars to hostling vehicles and empty containers from returning hostling vehicles back to rail cars. All of this transfer equipment will be powered by Diesel engines and generate exhaust emissions during operation.

Another area of concentrated mobile source activity will be the landfill face itself. In the area where final waste deposition occurs, crawler tractors will spread the dumped waste to shape the fill, while compactors will roll over the graded surface to develop the desired volume reduction of deposited material. After final compaction of waste, crawler tractors will spread and compact a layer of cover material.

Prior to the placement of waste in the mine pit, a liner will be installed as a part of the leachate collection system. Liner construction activities are included with the initial construction of the Proposed Project as discussed in Attachment B. Because liner construction will occur periodically during the development of the landfill, the emissions associated with this activity are also discussed in this section along with emissions associated with the day to day operations of the landfill.

The liner material will be derived from reclaimed fine tailing and overburden piles created during operation of the former iron mine. The clay material in the fine tailing area will be excavated by frontend loader and loaded into trucks for transport to the liner construction area where it will be spread and compacted by bulldozers and compactors. Material from overburden piles will also be excavated by frontend loader and fed to a material processing plant for screening. A portion of this material will require additional size reduction at a crushing plant to meet the size specifications for the drainage layers of the liner. The material screening and crushing plants will be portable and be moved from site to site depending of the pile being processed. The processed material will be loaded into trucks for transport to the liner construction area where it will be spread and compacted by bulldozers and compactors. Exhaust emissions will be produced by each piece of equipment in the process, with the exception of the material processing plants, which will be electrically powered.

The project will also reclaim material from onsite coarse tailing and overburden piles to produce daily and final cover material for the waste. In this operation, frontend loaders will excavate material from coarse tailing/overburden piles and feed it to the material processing plant discussed in the above paragraph. The processed material will be transported by trucks to the final cover construction area and landfill face, where it will be spread and compacted. Exhaust emissions will be produced by the loaders, dump trucks, and bulldozers and compactors used at the final cover construction area and working face of the landfill to spread and compact the cover material.

A separate fleet of vehicles will be used onsite to maintain the roadways used to transport liner, waste, and cover material. Water trucks will water-flush paved roads and wet unpaved roadway surfaces during landfill operations to mitigate fugitive dust emissions and enhance compaction of surface material. As the main roads providing access to the working face of the landfill will be constructed in part on the landfill surface itself, periodic reconstruction will occur as the surface of the fill rises from the bottom of the pit. Graders will be used to apply new aggregate material to road surfaces. All of these vehicles will generate exhaust emissions in the pit area during the life of the project.

In the excavation of ore by the former mining operation, benches were cut into the pit walls to catch falling rocks and to provide temporary roads for mine vehicles. These benches now harbor significant accumulations of loose rock which limit their ability to provide protection from falling rock to work forces in the lower portions of the pit. To regain a measure of safety, crawler tractors will be used to push accumulated debris off of each bench prior to commencing waste disposal in that portion of pit below. Exhaust emissions from these vehicles will be generated during operation.

A network of pipes will be installed during the development of the project to transport landfill gas collected by a series of extraction wells and leachate/condensate collected by the liner system. Trenches will be excavated periodically for the installation of horizontal pipe runs. Exhaust emissions will be generated by backhoes and graders used in the installation effort.

4.3.3 Landfill Gas Generation and Combustion

Landfill gas will be formed over time as waste decomposes. In the absence of oxygen, hydrocarbon wastes will break down to form predominantly carbon dioxide and methane. Trace quantities of toxic gases will also be formed by these processes. As a result of the stringent design and monitoring requirements of the SCAQMD and EPA municipal solid waste landfill regulations, the landfill gas collection system will be required to capture at a minimum at least 90% of the gas generated. This minimum landfill gas capture efficiency was calculated based on the maximum overall Total Hydrocarbon (THC) surface concentration limit allowed under SCAQMD Rule 1150.1 and a screening level air dispersion modeling analysis. Detailed calculations of the minimum landfill gas collection system capture efficiency are included in Attachment A. Captured landfill gas will be piped to a combustion system for incineration. To account for the worst-case combustion emissions, this analysis assumes that 100% of the landfill gas generated is piped to the combustion system for incineration. In addition, to account for the worst-case fugitive landfill gas emissions, this analysis also assumes that 10% of the landfill gas generated escapes into the atmosphere. Consequently, with this approach, there is some double counting of emissions.

The gas combustion system will initially use flares to burn the methane and other gases. The flares will be designed to mix the landfill gas with air and burn it in an

landfill gas model. Data were obtained from the Riverside County Waste Resources Management District regarding characteristics of the four Riverside County landfills that have active gas collection systems. These characteristics include the tons of waste in place, the length of time waste was (has been) deposited in the landfill, and average landfill gas flow rate, and the methane fraction of the gas. Based on these characteristics, EPA's landfill gas model was used to back-calculate a value for L_o that corresponds to the measured landfill gas flow rate for each landfill. These calculations were performed both for EPA's current default regulatory value of k (0.05), and for EPA's current AP-42 emission factor value of k (0.02). These calculations resulted in the following average values for the four Riverside County landfills:

for k = 0.02, L_o = 65.3 m^3/Mg (2304 ft^3/Mg)
for k = 0.05, L_o = 44.9 m^3/Mg (1584 ft^3/Mg)

Next, these pairs of values were used to model the landfill gas generation from the Eagle Mountain landfill. These model runs predict a maximum landfill gas generation rate from the Eagle Mountain landfill of 46,886 scfm (for k = 0.02) and 37,986 scfm (for k = 0.05).

Consequently, the maximum gas generation rate of 46,000 scfm used in the previous EIR/EIS, which was based on empirical data from Southern California landfills, is believed to be the most appropriate value, and remains conservative due to expected decreases in both methane generation potential and waste moisture content associated with continuing recycling efforts in Southern California, as compared with the time periods (1950's through 1990's) for which the existing landfills collected waste. Furthermore, the drier climate at the Eagle Mountain landfill, as compared with the existing Southern California landfills from which the empirical data were derived, suggest that the 46,000 scfm value overstates the potential gas generation at the site.

Data collected from landfill gas flares in the South Coast Air Basin show criteria pollutant emissions to vary significantly from flare to flare. These variations are most likely due to differences in construction and operation of the flares and to variations in the mixture of gases generated by each landfill. Standards for flare construction adopted by the South Coast Air Quality Management District in recent years and improvements in combustion technology will reduce some of the emission variability in new flares. In selecting emission factors representative of the flares proposed, data from source tests, South Coast Air Quality Management District regulations, equipment vendor data, and data supplied by the South Coast during the initial air quality permitting of flare station number 1 in 1994 were reviewed. These data are summarized in Attachment A, with a best estimate of flare emission factors based upon project design. Criteria emission rates from the flares, based upon maximum gas production rates and estimated emission factors, are shown in Table 4-1, with detailed emission calculations included in Attachment A.

Trace quantities of toxic gases are contained in landfill gas and will be emitted from both the landfill surface and from the gas flares. The flares are expected to destroy approximately 98% of the toxic gases found in the raw landfill gas. A more detailed discussion of the toxic air pollutants and corresponding impacts are discussed in Attachment C (Risk Assessment).

4.3.4 Fugitive Dust

Almost all project activities that involve the use of mobile equipment will generate fugitive dust. Although the solid waste will not be dry enough or have a sufficient fraction of fine material to contribute measurably to particulate emissions, the movement of vehicles over paved and unpaved surfaces within the project's boundaries will cause fugitive particulate emissions. Material spilled onto paved roads will be ground and suspended by traffic. The surface of unpaved roadways will abrade and become airborne with the passage of vehicles. Fine particles in the fine and coarse tailing and overburden piles will become airborne with the handling of these materials. Although mitigation techniques can significantly reduce particulate emissions from all sources, such emissions cannot be eliminated fully. A summary of computed fugitive dust emissions from the project appears in Table 4-1 with detailed emission calculations included in Attachment A.

The emission rate of fugitive dust from roadway surfaces will be dependent upon a number of roadway and vehicle characteristics. Research indicates that the mass of fine particles within the loose material on a road surface will be the most significant parameter in the emission equation. This mass tends to be small on paved roads as the asphalt or concrete does not significantly abrade with traffic flow. Instead, the major sources of loose material on paved project road will be material dropped from vehicles previously traveling over bare earth areas, spillage of cover or liner material from haul trucks, tire wear, and dust fallout from nearby sources. In the case of unpaved roads, loose surface material will be generated primarily by the tire friction of passing vehicles on easily eroded soil particles. Additionally, the grinding action of tire friction will reduce the particle size of loose surface material, whether on paved or unpaved roads, until a point is reached where particles will be readily entrained in the turbulent wakes of passing vehicles.

The characteristics of the passing vehicles will also dictate the amount of particulate generated with traffic flow. As the entraining forces on surface particles are dependent upon wind velocities generated by passing vehicles, vehicle speed will have a large influence on emission rates. Some surface particles in a vehicle's track will be thrown into the air by the passage of tires over that portion of the roadway. As a result, the number and size of tires on each vehicle will influence emission rates. The volume of traffic on a road surface will have a direct impact on emission rates over time. Finally, as the grinding action of tires is influenced by the pressure of the tires against a road's surface, the weight of each vehicle will have an influence on its fugitive dust emission rate.

In producing suitable material for pit lining and waste covering operations (daily and final), fine and coarse tailing and overburden material will be processed on-site. For the clay layer of the landfill liner system, material will be excavated from former fine tailing ponds by frontend loaders and transported to the liner construction area. As a significant portion of the fine tailing consists of silt-sized particles, this activity would generate significant emissions if performed unabated. However, for optimum material performance as a liner system, the fine tailing must be maintained with a moisture content ranging from approximately 16% to 20%. Consequently, the material will be prewatered prior to excavation, and additional water will be added during spreading and compaction of the material at the liner construction area. This moisture content will effectively eliminate emissions of fugitive dust from the liner material during the process of excavation, material loading, and spreading.

Coarse tailing and overburden will constitute most, if not all, of the material needed for liner construction and daily/final cover. Frontend loaders will excavate the tailing/overburden from storage piles. Depending on the end use of the material, either a screening or crushing plant will be used to process the material. A majority of the cover and liner construction material will be processed by a portable screening plant. The material will be dropped into the dump hopper of the screening plant which will feed a screening system, with the resulting size-segregated material conveyed to temporary storage piles. Portions of the drainage layers of the landfill liner system will require additional crushing. Consequently, this material will be fed to a portable crushing plant for material sizing. Screened/crushed material from temporary storage will be loaded into haul trucks by frontend loaders and transported to the working face of the landfill, liner construction area, and/or final cover construction area. At the working landfill face and liner/final cover construction areas, dumped material will be spread and compacted by crawler tractors and compactors.

Dust will be generated at each step of the coarse tailing/overburden excavation, processing, and spreading operation. Because of the very low fraction of this material which is smaller than 1/8 inch, and because of its low abrasion tendencies, the overall dusting potential of this material is comparatively low. The federal New Source Performance Standard for nonmetallic mineral processing plants requires low opacity emission levels or wet scrubbers. The South Coast Air Quality Management District Best Available Control Technology guidelines recommends baghouses or wet scrubbers for the control of dust from rock crushing facilities. In complying with these standards, emissions from the screening and crushing plants will be maintained at low levels. Some dust will be emitted in transferring material to haul trucks and during the dumping operations at the landfill face and liner/final cover construction areas.

Low levels of dust will be emitted during water truck operation as water trucks travel slowly during paved road flushing and unpaved road wetting. Fugitive dust emissions from this operation will be much lower than those generated by waste or cover material hauling due to the equipment's relatively slow operating speeds.

During road maintenance, fugitive dust will also be generated as graders and compactors reposition haul roads. Since road base will be watered to enhance compaction as it is applied, and because the process of road buildup will be performed by slow-moving equipment, emissions from this activity will remain low in comparison to other project activities.

Fugitive dust will also be generated during the clearing of natural debris from the pit benches. Crawler tractors will push this material off of benches as the landfill face moves along the pit walls. In this analysis, the bench-clearing emission factor was derived from factors reported for crawler tractors operating in surface coal mines, although material at coal mines is known to be softer than that at the Landfill Site. This results in an overestimate of expected emissions from this activity.

Another source of dust will be the installation of pipes for the landfill gas and leachate/condensate collection system. Backhoes will dig trenches into which landfill gas collection and/or leachate/condensate pipes will be installed. Graders will be used to cover the ditches and recontour the surface. Dust will be produced during both of these operations, but as equipment movements will be relatively slow, the fugitive dust emission rates will be low.

Finally, there will be particulate emissions due to windblown fugitive dust from unpaved areas disturbed by vehicle traffic and excavation activities. However, these emissions will be minimized by limiting the size of areas disturbed by mobile equipment.

4.3.5 Miscellaneous Sources

The project will include landfill support operations such as a maintenance paint shop, locomotive sand silo, emergency generators, and fuel storage and dispensing operations. The maintenance paint shop will be located in the Planning Area 2 intermodal yard and will be used to do minor touch-up painting of landfill equipment. This operation will result in VOC and particulate emissions. To comply with South Coast AQMD regulations, the paint shop will be equipped with a dry filter system to control particulate emissions and will use low VOC coatings. The locomotive sand silo will also be located in the Planning Area 2 intermodal yard and will be used to store and load the waste haul locomotives with sand for traction control. Particulate emissions will result during sand loading and unloading. To comply with South Coast AQMD regulations, the sand silo will be equipped with a dust collector. In case of utility-supplied power interruptions, the project will include two 100 kW natural gas fired emergency generators. One generator will be located in the Planning Area 2 intermodal yard, and the second generator will be located in the Planning Area 3 intermodal yard. Other than operation during power outages, the generators will be operated for approximately 1 hour per week for maintenance purposes. Operation of the emergency generators will result in combustion emissions. To supply fuel for onsite mobile equipment and the waste haul locomotives, the project will include fuel storage and dispensing operations. The Planning Area 2 intermodal yard will include

a 55,000 gallon above ground Diesel storage tank and a 13,750 gallon above ground gasoline tank. To comply with South Coast AQMD regulations, the gasoline storage tank will be equipped with Phase I and II vapor control systems. The Planning Area 2 intermodal yard will also include a 15,000 gallon aboveground Diesel storage tank for transfer truck fueling. The Diesel and gasoline tanks will result in VOC emissions during tank filling and vehicle fueling. VOC emissions will also be associated with leachate/condensate storage tanks that will be located near the Planning Area 2 intermodal yard. To comply with South Coast AQMD permitting requirements, these tanks will be equipped with carbon canister to control VOC emissions. Table 4-1 summarizes the emissions associated with the miscellaneous support operations, with detailed emission calculations included as Attachment A.

4.3.6 Townsite

The Eagle Mountain Townsite Specific Plan has twelve separate planning areas. Some of these have existing facilities which will continue in operation. Other areas will have new residential or commercial facilities. The emissions from the full use of these development plans were estimated using the screening tables in the SCAQMD CEQA Air Quality Handbook. Separate factors are available for mobile source activity and for area source activity. However, both factors have the same units so that they can be combined into a single emission factor for a particular activity. In order to use these screening estimates, it is necessary to know the number of dwelling units in residential areas and the gross floor area in commercial areas. The proposed number of new dwelling units was taken from the plans for the different areas. The floor area for commercial buildings was estimated by assuming that 50% of the available acreage would be built out. The total new activity consists of 37 multiple dwelling units, 283 single dwelling units, and 407,286 ft^2 of commercial space.

The following screening emission factors from the SCAQMD CEQA handbook were used to estimate emissions from these activities.

- The mobile and area source factors (in lb/day/dwelling unit) for apartments were used for multiple dwelling units.
- The single family housing factors (in lb/day/dwelling unit) were used for single dwelling units.
- Emission factors for the area-source activities of the commercial areas were computed as a weighted sum of the various emission factors for commercial operation.

There are a variety of emission factors for commercial activities. These include offices, schools, and stores. For purposes of estimating an overall emission factor, the commercial activity was assumed to be 50% offices and 50% stores. The emission factors for a small business park were used to characterize the office activities. This is the largest emission factor for offices, but it is not significantly

different from the other factors for office buildings. However, the emission factors for stores vary widely depending on the type of store present. An assumed weighting of the different types of stores was used to compute the emission factor for stores. This weighting is shown in Attachment A. The weighting is applied to the area source emission factors to arrive at a composite factor for stores for stores. This factor is then averaged with the area source emission factor for business parks to obtain the final emission factor for commercial activities.

Only the area source emission factors for commercial activities were used because the screening emission factors for mobile sources in the SCAQMD CEQA guidelines are based on the trips generated by an individual project. For the proposed townsite development, which consists of both housing and commercial areas, the application of mobile source emission factors to both the dwelling and the commercial factors would double count the actual mobile source emissions. This was verified by examining the details of the calculation of these screening emission factors. The trip generation per vehicle for a detached dwelling unit was assumed to be 6.27 trips per day, each of which had a cold start. This essentially accounts for all the operation of the vehicle in a given day, justifying the use of only the dwelling unit emission factors. This assumes that the development of commercial facilities at Eagle Mountain will not generate a significant number of trips from outside the area.

Table 4-1 summarizes the emissions for the Townsite; detailed emission calculations are included in Attachment A.

4.4 Project Impacts (Without Mitigation)

4.4.1 Total Project Emissions

Total project emissions from all sources at maximum projected operating levels were shown in Table 4-1 (above). These emission levels take into account the emission controls that the project must incorporate in order to comply with South Coast Air Quality Management District and U.S. Environmental Protection Agency emission standards. Detailed emission calculations are included in Part 6 which specifically identify equipment operating levels, emission controls, emission factors, and references.

4.4.2 Project Impacts Near Proposed Project

Using the methodology described in detail in Attachment D, an analysis was performed of the impacts of the project on ambient concentrations of pollutants. This analysis was performed for the area surrounding the Project Site. A separate analysis of the ambient impacts on the Joshua Tree National Park was also performed; a detailed discussion of the analysis is included in Attachment E. In addition, an analysis of ambient air quality impacts was performed for a typical rail crossing impacted by the project.

All of the analyses described below were performed with a high degree of conservatism, with the result that the calculated concentrations shown are much higher than the levels which would likely be experienced. This conservatism results from the following assumptions:

1. Landfill gas generation rates are the maximum forecast, 66.25 million cubic feet per day. This forecast was based on gas generation rates in the South Coast Air Basin. As discussed elsewhere in this report, gas generation rates at the Landfill Site are expected to be much lower. Furthermore, this maximum landfill gas generation rate is not expected to be reached for at least 30 years after the project begins operation, if it is reached at all.

2. The combustion emissions for the flare system assumes that 100% of the landfill gas generated will be piped to the flares for incineration, while it is likely that a small fraction of this gas (i.e., 5 to 10 percent) may actually escape the system as fugitive emissions.

3. Only currently available emission control technologies have been assumed, although recent history has shown that dramatic improvements will likely be made between the start of the project and the date worst case impacts could occur.

Table 4-2 presents the results of the air quality modeling analysis. As discussed above, the analysis was performed with a high degree of conservatism. Consequently, actual project impacts would be expected to be significantly lower than those shown.

The data indicate that the project's unmitigated impacts would represent the following fractions of the most stringent ambient air quality standards for each pollutant:

Carbon Monoxide	8%
Nitrogen Dioxide	69%

Table 4-2
Eagle Mountain Landfill and Recycling Center
Proposed Project Without Mitigation
Ambient Air Quality Impacts

Pollutant/ Averaging Time	California Standards	National Standards	EPA Class II Increments ($\mu g/m^3$)	Modeled Ambient Impact ($\mu g/m^3$)	Ambient Background Levels[1] ($\mu g/m^3$)	Combined Levels ($\mu g/m^3$)
NO_2						
1-hour	470	-	-	323	75	398
Annual	-	100	25	22	6	28
SO_2						
1-hour	655	-	-	38	213	251
3-hour	-	1300	512	36	-	-
24-hour	105	365	91	12	34	46
Annual	-	80	20	2	11	13
CO						
1-hour	23,000	40,000	-	1,761	10,354	12,115
8-hour	10,000	10,000	-	655	4,304	4,959
PM_{10}						
24-hour	50	150	30	38[2]	210	248
Annual	30	50	17	6	22	28

Footnote:

1 For NO_2, CO, and PM_{10}, maximum levels monitored at the Project Site. Because ambient SO_2 levels were not measured at the Project Site, background SO_2 levels are the maximum monitored within the SEDAB.

2 The maximum allowable Class II PM_{10} increment may be exceeded during one 24-hour period at any one location. For the mitigated project, the Class II increment was not exceeded more than once at any location.

Sulfur Dioxide	11%
Fine Particulates (PM_{10})	76%

These levels are predictions of the worst-case project impacts at any location outside of the project boundary in the absence of mitigation measures. As shown in Attachment D, the maximum modeled impact occurs at a location towards the north (CO), northwest (NOx and PM_{10}) and west (SO_2) of the community of Eagle Mountain.

The data indicate that, in the absence of mitigation measures, the Proposed Project is not expected to result in a violation of the state or national standards for NO_2, SO_2

and CO, even in combination with background ambient levels measured at the Project Site. For PM_{10}, Project impacts alone are not expected to exceed the state or national standards. However, the state and national 24-hour average PM_{10} standards are exceeded in the absence of the Project. The Project's impacts are therefore considered to exacerbate violations of the PM_{10} standard.

4.4.3 Impacts at Typical Rail Crossing

During the scoping process, several commenters suggested that there may be adverse air quality impacts at locations in Southern California where rail crossings are at grade and periodically result in traffic backups waiting for a passing train. Using the same data presented elsewhere in the report regarding traffic impacts, a modeling analysis was performed to evaluate the worst-case potential air quality impacts at a rail crossing. The results are presented in Table 4-3.

Table 4-3
Eagle Mountain Landfill and Recycling Center
Proposed Project Without Mitigation
Air Quality Impacts at Rail Crossings

Pollutant/ Averaging Time	Strictest California Standard ($\mu g/m^3$)	Strictest National Standard ($\mu g/m^3$)	Maximum Impact ($\mu g/m^3$)	Percent of Standard (%)
CO (1-hour)	23,000	40,000	332	1.4
NO_2 (1-hour)	470	—	129	27.3

The results of this analysis are presented for one-hour averaging periods only, since these impacts would occur for only short periods of time during the day. The data indicate that there would be only a minor impact for carbon monoxide during train crossings. The nitrogen dioxide impact reflects the short-term concentration which could be reached near the intersection, assuming worst-case weather conditions. As with previous analyses, these levels are likely to overestimate actual concentrations.

4.4.4 Impacts on Joshua Tree National Park

A detailed analysis of the Proposed Project's impacts on the Joshua Tree National Park is included as Part 6. Overall, the Proposed Project will not create a noticeable change in regional haze or visibility. Also, acid deposition impacts, as well as impacts on vegetation, are not significant. Finally, the Proposed Project without mitigation will not exceed the EPA Class I area increments, except for the 24-hour average PM_{10} increment.

4.4.5 Cumulative Impacts at the Project Site

A detailed analysis of the cumulative impacts at the Project Site is included as Part 8.

4.5 Consistency with Regulatory Programs

4.5.1 Consistency with Federal Requirements

Prevention of Significant Deterioration (40CFR, Part 52.21). The determination as to whether the Proposed Project will be subject to Prevention of Significant Deterioration (PSD) review is based on its emissions. For the Proposed Project, the "source" which could be subject to review includes the landfill gas flares, emergency generators, maintenance paint shop, locomotive sand silo, and screening and crushing plants. Table 4-1 displays the emissions for this equipment and the corresponding PSD emission trigger levels. Since landfills are not one of the special listed sources under the PSD regulations, fugitive emissions such as wind-blown dust, onsite mobile source activities, and fugitive landfill gas are not included in the assessment of PSD applicability. This conclusion that emissions from mobile and fugitive emission sources are excluded from the PSD applicability determination was confirmed during the previous environmental review of the project when the EPA determined that the Proposed Project would not trigger PSD review.*

The use of flares to incinerate landfill gas, in compliance with all other regulations, could cause the Proposed Project to exceed PSD trigger levels at the maximum expected flow rate, in the absence of any mitigation. In order to reduce project emissions, however, mitigation has been proposed for flare emissions. Such mitigation will be provided through the installation of energy recovery systems when landfill gas generation rates reach a level at which these types of systems become feasible. Energy recovery systems could include an onsite gas turbine power plant or landfill gas processing plant where processed gas is used either onsite to power mobile equipment or transported offsite for use by public utilities. If energy recovery systems do not turn out to be feasible, the landfill gas flares will be equipped with control systems to meet the emission levels shown on Table 4-4.

An oxidation catalyst, in a temperature regime up to 1400°F, can achieve better than 90% control efficiency for carbon monoxide in normal operation. The same catalyst bed will produce reductions in reactive organic gas emissions exceeding 50%. The selective non-catalytic reduction catalyst would use ammonia or urea to reduce NOx emissions by 30%. The oxidation catalyst system would be installed on the flares if gas generation exceeds approximately 10 million cubic feet per day. The selective catalytic reduction system would be installed if gas generation exceeds approximately 50 million cubic feet per day.

---

* EPA letters dated 4/22/92 and 11/26/93 to Mine Reclamation Corporation.

Table 4-4
Eagle Mountain Landfill and Recycling Center
Proposed Project Without Mitigation
Emissions Subject to PSD Review
(tons/yr)

Equipment	NOx	CO	PM_{10}	VOC	SO_2
Landfill Gas Flares[1]	231	165	147	67	85
Screening Plant			1		
Crushing Plant			1		
Locomotive Sand Silo			0		
Fuel Storage Tanks				0	
Leachate/Condensate Tanks				0	
Paint Shop			0	2	
Emergency Generators	0	1	1	0	0
Total Emissions	231	166	148	69	85
PSD Trigger Level	250	250	250	250	250
Trigger PSD?	No	No	No	No	No

Footnotes (Table 4-4):

[1] Emission levels based on flares equipped with urea injection for control of NOx and oxidation catalyst for control of CO and VOC.

New Source Performance Standards for Non-Metallic Mineral Processing Plants (40CFR, Part 60, Subpart OOO). This regulation limits the particulate emissions for subject sources. This regulation would apply to the proposed onsite material processing plants. The proposed material processing plants will meet the requirement of this regulation with the use of water sprays and dust collectors.

New Source Performance Standard for Municipal Solid Waste Landfills (40CFR, Part 60, Subpart WWW). Subpart WWW requires the Proposed Project to install a gas collection system and a system for disposing of the collected gas. This regulation applies to the Proposed Project. The Proposed Project will meet these requirements with the installation of a gas collection system and dispose of the collected gas with flares and/or an energy recovery system.

National Emissions Standards for Hazardous Pollutants (40CFR, Part 61). There are no National Emissions Standards applicable to the Proposed Project.

Title III Hazardous Air Pollutants. This title of the 1990 Clean Air Act establishes a program for regulating hazardous air pollutants from area source and industrial categories rather than concentrating on individual pollutants. EPA has established a list of major source categories for the purpose of setting standards. Municipal solid waste landfills is one of the source categories identified by the EPA for purposes of establishing a standard. The standard for landfills is expected to be developed by the EPA by the end of the year 2000.

Title V Operating Permits Program (40CFR, Part 70). This program establishes a comprehensive operating permit program for Major stationary sources. Since the only purpose of the Title V regulation is to combine all applicable requirements from other air quality regulatory programs into a single permit, there are no additional emission limits or control technology requirements imposed by the program. The Proposed Project will be subject to the Title V permit program.

Federal Conformity Requirements. The Clean Air Act (Section 176) required EPA to promulgate rules to ensure that federal actions conform to the appropriate State Implementation Plan. In 1993, EPA adopted regulations implementing Section 176 of the federal Clean Air Act, as amended (42 U.S.C. Sec 176). Under the EPA "general" conformity regulations, which pertain to actions not involving transportation or transit plans for projects (40CFR Parts 6, 51 and 93, adopted November 15, 1993, and published at 58 FR 63214 et seq.), conformity requirements apply only to emissions impacts in areas that have been designated as either "nonattainment" or "maintenance" by EPA. This is further clarified in a recently signed highway bill (National Highway System Designation Act of 1995) which modifies the applicability definition of Section 176 so that it only applies with respect to nonattainment and maintenance areas (i.e., not attainment areas).

Section 51.853 of EPA's Final Rule on conformity specifies applicability criteria by establishing de minimis levels for Federal Actions in nonattainment areas and maintenance areas. Paragraph (c)(2) states that the "following actions would result in no increase or an increase in emissions that is clearly de minimis: ... (xiv) Transfers of ownership, interests, and titles in land, facilities and real and personal properties regardless of the form or method of transfer". Based on this criteria, the project is not subject to federal conformity requirements.

Furthermore, the project is located in an attainment area and there is no SIP to conform to. The Final Rule states it "will only apply in nonattainment and maintenance areas, as proposed." However, it indicates that EPA believed that it had discretionary authority to apply general conformity procedures to attainment areas and that it would seek comment on the subject in a supplemental notice. No supplemental notice on this subject has been issued and a recently signed highway bill (National Highway System Designation Act of 1995) modifies the applicability definition of Section 176 so that it only applies with respect to nonattainment and maintenance areas (i.e., not attainment areas).

Based on the two findings above, it is clear that the project is not subject to a conformity determination. Nevertheless, a question can be raised as to whether the project satisfies the spirit of conformity since it has emissions impacts in both an attainment and nonattainment area. Looking at the emissions impacts in the nonattainment area, the project was evaluated for two criteria:

(1) are the transportation emissions included in the TIP? and;

(2) are the other emissions generated by the project below the de minimis levels?

With regard to transportation emissions, the project will not cause any highway facility modifications and may lead to a net reduction in truck traffic since the material will be shipped primarily by rail. Since the TIP only addresses highway improvements and the project causes no increase, or a reduction in traffic, the first criteria is satisfied. With regard to the de minimis rule, the project will cause a net reduction in emissions inside of the nonattainment area; therefore, that criteria is satisfied.

In summary, the Eagle Mountain Landfill Project is not subject to a conformity determination, but if it was, it would satisfy all applicable criteria.

4.5.2 Consistency with Local Requirements

Prohibitory Rules. The South Coast Air Quality Management District limits the emissions of various pollutants from many sources in the District, including landfill flares and other gas combustion devices. These rules will apply to the Proposed Project, and the project has been designed to comply with them. The applicable rules and a brief summary of each are discussed below.

- Rule 53 (Specific Air Contaminants) - This rule limits the concentration of sulfur compounds in the exhaust of any source. The rule will apply to the landfill gas flares and emergency generators.

- Rule 201 (Permit to Construct) - This rule requires that a permit to construct be obtained from the South Coast AQMD prior to construction of a source of air pollutants that is not otherwise exempted. This rule will apply to the landfill gas flares, maintenance paint shop, material processing plants, locomotive sand silo, emergency generators, fuel storage tanks, gas collection systems, and leachate/condensate recovery systems.

- Rule 202 (Permit to Operate) - This rule requires that a permit to operate be obtained from the South Coast AQMD prior to operation of a source of air pollutants that is not otherwise exempted. This rule will apply to the landfill gas flares, maintenance paint shop, material processing plants, locomotive sand silo, emergency generators, fuel storage tanks.

- Rule 401 (Visible Emissions) - This rule limits the opacity of visible emissions from any source. Under current District policy, this rule will apply to emissions from the landfill gas flares, maintenance paint shop, and material processing plants.

- Rule 402 (Nuisance) - This rule prohibits emissions in quantities that adversely affect public health or cause annoyance to a considerable number of people. This rule will be applicable to all operations of the project.

- Rule 403 (Fugitive Dust) - This rule limits the visibility and particulate matter concentration of dust plumes at project boundaries. Fugitive dust emissions from haul roads, excavation areas, and waste disposal areas will be regulated by this rule.

- Rule 404 (Particulate Matter - Concentration) - This rule limits the concentration of particulate matter emitted from source stacks. This rule will apply to the landfill gas flares, emergency generators, maintenance paint shop, and the dust collector exhausts associated with material processing plants and locomotive sand silo.

- Rule 405 (Solid Particulate Matter - Weight) - This rule limits the mass emission rate of particulate matter from sources. This rule will apply to the maintenance paint shop, material processing plants, and locomotive sand silo.

- Rule 407 (Liquid and Gaseous Air Contaminants) - This rule limits carbon monoxide and sulfur dioxide emissions from combustion processes. This rule will apply to the landfill gas flares.

- Rule 409 (Combustion Contaminants) - This rule limits the concentration of particulate matter from combustion sources. The landfill gas flares will be regulated by this rule.

- Rule 431.1 (Sulfur Content of Gaseous Fuels) - This rule limits the sulfur content of gas combusted on-site or offered for sale. This rule will apply to the landfill gas flares, emergency generators, and the sale of any landfill gas.

- Rule 461 (Gasoline Transfer and Dispensing) - This rule requires gasoline storage tanks and tanker trucks to be equipped and operated with vapor recovery systems. This rule will apply to the onsite gasoline storage tanks proposed for the project.

- Rule 474 (Fuel-Burning Equipment - Oxides of Nitrogen) - This rule limits the concentration of NOx emissions from non-mobile fuel burning equipment. This rule will apply to the emergency generators.

- Rule 481 (Spray Coating Operations) - This rule requires spray coating equipment to be operated within a controlled enclosure. This rule will apply to the maintenance paint shop.

- Rule 1107 (Coating of Metal Parts and Products) - This rule specifies the equipment and application method to be used during coating operations and limits the volatile organic compound content of coatings. This rule will apply to the maintenance paint shop.

- Rule 1150 (Excavation of Landfill Sites) - This rule disallows the excavation of an active or inactive landfill without a District-approved plan. This rule will apply to the project.

- Rule 1150.1 (Control of Gaseous Emissions from Active Landfills) - This rule requires the collection and treatment of landfill gases. It will apply to the landfill gases generated by the project.

- Rule 1171 (Solvent Cleaning Operations) - This rule limits the volatile organic compound content of solvents used to perform solvent cleaning operations. This rule will apply to the maintenance paint shop.

Regulation IX (New Source Performance Standards). The South Coast Air Quality Management District has adopted by reference the federal New Source Performance Standards. The South Coast Air Quality Management District has not received delegation of Subpart Cc and Subpart WWW of the New Source Performance Standards. A discussion of the applicable federal New Source Performance Standards is included in Part 2.

Regulation X (National Emission Standards for Hazardous Air Pollutants). The South Coast Air Quality Management District has adopted by reference the federal National Emissions Standards for Hazardous Air Pollutants. A discussion of the applicable federal National Emissions Standards for Hazardous Air Pollutants is included in Part 2.

Regulation XIII (New Source Review). The South Coast Air Quality Management District New Source Review rules (contained in Regulation II and Regulation XIII of the SCAQMD Rules and Regulations) govern the preconstruction review of new and modified stationary sources. The project site is located in the Southeast Desert Air Basin, which is designated as unclassified for all pollutants with respect to the National Ambient Air Quality Standards. With respect to California Ambient Air Quality Standards, the desert portion of Riverside County (including the project site) is designated nonattainment for ozone and fine particulate matter (PM_{10}), and attainment or unclassified for all other pollutants.

Regardless of attainment status, the project must undergo new source review for all criteria pollutants and their precursors. South Coast Air Quality Management District Rule 1302 defines reactive organic gases and nitrogen oxides as precursors to ozone, and reactive organic gases, nitrogen oxides, and sulfur oxides as precursors to particulate matter.

For the purpose of new source review, Rule 1302 defines a facility as:

> Any permit unit or grouping of permit units or other air contaminant-emitting activities which are located on one or more contiguous properties within the District, in actual physical contact or separated solely by a public roadway or other public right-of-way, and are owned or operated by the same person (or by persons under common control).

In the evaluation of projects by the South Coast Air Quality Management District, related fugitive emissions are often included in the calculation of accountable project emissions. With respect to the Proposed Project, the District will not be permitting the landfill itself. Only the landfill gas collection and disposal system, fuel storage and dispensing operations, maintenance paint shop, material processing plants, locomotive sand silo, and emergency generators will be permitted. District policy has held that the fugitive emissions from the landfill operation per se will not be included in the new source review analysis.

Furthermore, District policy has been that only those mobile source emissions directly associated with a permit unit must be considered. Since only the material processing plants will have dedicated mobile equipment, only these mobile sources will be included during the District permitting process. As determined during the previous District permit review of the project, emissions from on-site vehicles other than those directly associated with the material processing plants, as well as exhaust emissions from project-related cargo carriers (on-highway trucks and locomotives), will not be included in the new source review analysis.

The South Coast AQMD has previously issued permits for the following equipment associated with the landfill:

- Fuel storage and dispensing facilities (2)
- Diesel fuel storage tanks (2)
- Emergency generators (2)
- Maintenance sand blasting equipment
- Maintenance paint spray booth
- Locomotive sand storage silo and handling equipment
- Condensate/leachate collection and storage system

In addition, draft permits were issued by the District for two landfill gas flares and for the landfill gas collection system during the first half of 1994. Issuance of these two permits has been delayed pending the recertification of the EIR/EIS.

Rule 1303 requires that the applicant apply Best Available Control Technology (BACT) to any new or modified stationary source. In its Best Available Control Technology Guideline, the South Coast Air Quality Management District specifies the minimum control technology requirements for landfill gas flares. The Guideline specifies two general alternative levels of control that would apply to the project emissions: (1) the use of control methods that are technologically feasible, barring a demonstration that the methods are not cost-effective, or (2) the use of control methods that have been achieved in practice or are contained in an EPA-approved State Implementation Plan, regardless of cost.

For the landfill gas flares, the BACT Guideline specifies the following control methods:

Technologically Feasible

Nitrogen oxides:	less than 0.06 pounds of NOx per million BTU
Sulfur oxides:	gas scrubbing and/or carbon adsorption for hydrogen sulfide removal
Particulates:	fuel gas filter

Achieved in Practice

Reactive organics:	ground-level, shrouded flare with > 0.6 second retention time at > 1400°F, automatic combustion air control, automatic shutoff gas valve and automatic restart system
Nitrogen oxides:	0.06 pounds of NOx per million BTU
Carbon monoxide:	same as reactive organics
Particulates:	knockout vessel

The Guidelines require that technologically feasible control measures be imposed unless it can be demonstrated that the capital and operating costs per ton of pollutant removed or destroyed are greater than the District's cost-effectiveness exemption thresholds. With the possible exception of the sulfur control systems, the above technologically feasible control measures have been found to be cost effective and required for landfill gas flares by the District. Therefore, with the exception of the sulfur control system, this analysis assumes that the technologically feasible control measures will be installed on the project's flares.

For the material processing plants and the locomotive sand silo, the BACT guideline specifies the following control methods:

Technologically Feasible

Particulates:	1.	Baghouse
	2.	Venturi Scrubber
	3.	Impingement Scrubber
	4.	Charged Fog Spray or Water Spray with Chemical Additives

Achieved in Practice

Particulates: Water Fog Spray

As with landfill gas flares, the technologically feasible controls for material processing plants and sand silos have been found to be cost efficient pursuant to the District's BACT cost thresholds. Consequently, for this analysis it was assumed that the required District BACT control measures would be required to control emissions from the material processing plants and locomotive sand silo.

For the maintenance paint shop, the BACT guideline specifies the following control methods:

Technologically Feasible

Reactive Organics	1.	Coating with lower solvent content than required by applicable rules and afterburner or carbon absorber achieving greater than 90% overall efficiency
	2.	Afterburner or carbon absorber achieving greater than 90% overall efficiency
	3.	Coating with lower solvent content than required by applicable rules

Achieved in Practice (only applicable for units with ROG emissions greater than 140 lbs/day)

Reactive Organics:	1.	Coating with lower solvent content than required by applicable rules and afterburner or carbon absorber achieving greater than 90% overall efficiency

Under District BACT policy for paint booths, no add-on control devices are required for paint booths emitting less than 48 pounds per day of reactive organics. Because it is estimated that the proposed paint shop will emit reactive organic levels well below this BACT cutoff, the maintenance paint shop will not be equipped with reactive organic controls other than the use of low volatile organic compound coatings.

For the fuel storage and dispensing operations, the BACT guideline specifies the following control methods:

Technologically Feasible

None Listed

Achieved in Practice

Reactive Organics: Vapor recovery system with an overall efficiency of equal to or greater than 95% with the use of vapor balance system, carbon adsorber, refrigerated condenser, or incinerator

For Diesel storage tanks of the size that will be installed at the project (i.e., less than 60,000 gallons), it has been District policy not to require these tanks to install the above BACT control measures. Consequently, the Diesel storage tanks for the project will be equipped with submerged fillpipes but no other additional control equipment. Phase I and II vapor control systems meeting the above requirements will be used for onsite gasoline storage tanks.

Rule 1303 requires that the applicant offset all net emission increases from any new or modified facility. During the previous environmental review of the Proposed Project, permit applications for two landfill gas flares were processed by the South Coast AQMD during the first half of 1994 and found to comply with the requirements of District rules. These permit applications were deemed complete by the South Coast AQMD and the District had issued public notice of its intention to issue the permits pursuant to District Rule 212. The public comment period resulted in three public comments and the District had resolved all issues and/or determined that they did not raise issues that would prevent issuance of the permits. However, the actual issuance of the permits for the two flares was delayed by the San Diego Superior Court decision on the EIR/EIS for the Proposed Project.

Landfill gas flares are considered to be an essential public service by the South Coast AQMD at this time, and are eligible to obtain emission offsets from the District's Priority Reserve. (The South Coast AQMD is currently holding the two flare permits and the Priority Reserve offsets already identified for these permits in abeyance pending the recertification of the EIR/EIS.) Under Rule 1304, landfill gas flares are exempt from requirements to obtain emission offsets if sufficient offsets are not available from the District's Priority Reserve. Consequently, if future emission offsets are not available from the District's Priority Reserve, then offsets would not have to be obtained for future landfill gas flares by the applicant.

Rule 1303 also requires that the applicant substantiate with modeling that the emissions from a new or modified facility will not cause a significant increase in air quality concentrations. Rule 1306, which prescribes the calculation procedures used by Regulation XIII, indicates that only emissions from permit units and specified mobile sources are to be covered. Based on these regulations, only the landfill gas flares, maintenance paint shop, locomotive sand silo, emergency generators, and material processing plants (with associated mobile equipment) would be included for modeling purposes.

Regulation XIV (Toxics). Rule 1401 will require that a health risk assessment be performed for permit units required to undergo new source review according to Regulation XIII. The project will comply with the requirements of Rule 1401 during the District permitting process. During the initial South Coast AQMD permit review process for the first two landfill gas flares during 1994, a screening level risk assessment was performed and approved by the South Coast AQMD which indicated that the two flares would not exceed Rule 1401 significance levels.

Regulation XVII (Prevention of Significant Deterioration). The District has applied for delegation of authority to implement the federal Prevention of Significant Deterioration program. This authority has not yet been granted by EPA. When granted by EPA, the District PSD program will have the same requirements as the federal program. The District PSD program differs from the federal program in respect to the emission levels necessary for a new or modified source to trigger the requirements of the program. The District PSD program has much lower applicability trigger levels than the federal program, and the emissions from the landfill gas flares operating at maximum projected levels would trigger District PSD review.

Regulation XX (RECLAIM). This regulation requires subject facilities to operate under an annual facility-wide emissions cap. Each year, this cap is decreased to match air quality planning requirements. The RECLAIM regulations prohibit landfill gas control systems and all facilities located in the Riverside County portions of the Southeast Desert Air Basin from entering the program. Consequently, the Proposed Project will not be subject to the RECLAIM regulation.

Regulation XXX (Title V Permits). The District's Title V regulation implements the operating permit requirements of Title V of the federal Clean Air Act. This regulation, which is not yet in effect, will result in a single operating permit being issued to the Proposed Project which will include all of the applicable federal air quality requirements.

South Coast Air Quality Management Plan. In 1994, the South Coast Air Quality Management District (SCAQMD) adopted a revised Air Quality Management Plan (AQMP) to identify specific emission reduction measures to comply with the 1990 federal Clean Air Act (CAA) and the 1988 California Clean Air Act. The federal CAA requires the SCAQMD to develop a Federal Attainment Plan for ozone; a post-

1996 Rate-of-Progress Plan; ozone attainment demonstrations for the Los Angeles County portion of the Southeast Desert Air Basin (SEDAB) (Antelope Valley) and the Riverside nonattainment area of the SEDAB (Coachella - San Jacinto Planning Area); and a PM_{10} State Implementation Plan (SIP) which incorporates best available control measures for fugitive sources.

The Proposed Project will be constructed and operated to comply with all applicable SCAQMD source-specific, prohibitory, and new source review regulations. Because these rules are developed to implement the control measures developed in the AQMP, by complying with the SCAQMD rules the Proposed Project will also be complying with the control measures of the AQMP.

4.6 Mitigation

This discussion of mitigation measures includes regulatory actions by other agencies which are reasonably foreseeable, or which have future effective dates, as well as measures which can be implemented by the applicant. Mitigation measures are organized below into two groups (i.e., existing requirements and additional mitigation measures). The existing requirements includes project mitigation required by existing regulatory measures. Emission estimates for the Proposed Project with and without mitigation reflect the reductions associated with these measures. The additional mitigation measures are control techniques proposed for the project that go beyond those measures required by existing regulations.

4.6.1 Existing Requirements

4.6.1.1 Truck Emissions

Diesel engine exhaust emissions from the truck transport of waste to the landfill will contribute to the cumulative environmental impact of the project. This transport will be carried out by waste disposal operations not under Mine Reclamation Corporation's direct control. Truck emissions from waste transport will be mitigated primarily by transporting most of the incoming waste by rail, thereby eliminating truck emissions except for the short haul from transfer station to railhead. This short haul is present to some degree in all project configurations and all alternatives to the project, including the No Project alternative. Truck emissions will also be mitigated by a number of California Air Resources Board and local district regulations already in place.

EPA/California Air Resources Board Emissions Standards. A very stringent NOx standard for new heavy-duty engines used in on-highway vehicles took effect in 1994. This standard requires NOx emissions less than 5.0 g/Bhp-hr and PM_{10} emissions less than 0.10 g/Bhp-hr. The 1994 standard also limits hydrocarbons to 1.3 g/Bhp-hr, carbon monoxide to 15.5 g/Bhp-hr, and particulates to 0.1 g/Bhp-hr. In 1998, further reductions will be required to meet a NOx emissions standard of 4.0 g/Bhp-hr. In

addition to this change, the EPA, CARB, and Engine Manufacturer's Association (EMA) have announced an agreement, in principle, on a 2004 standard of 2.5 Bhp-for NOx + HC combined. This is equivalent to a NOx standard of 2.0 g/Bhp-hr. Compared to uncontrolled emission levels, the 2004 NOx and PM_{10} standards will require roughly an 85% reduction in NOx and particulates.

Although these standards will apply only to new engines, they will result in gradual reductions in emissions as new trucks replace older ones. On average, it may take ten years for the majority of the benefits of new vehicle standards to be achieved.

California Air Resources Board Diesel Fuel Regulations. California Air Resources Board regulations presently limit the sulfur content of motor vehicle Diesel fuel sold in California to 0.05% by weight. This is one tenth of the sulfur which would otherwise be permitted under the ASTM standards for number 1 and number 2 Diesel fuel. In addition, a maximum aromatic hydrocarbon content of 10% by volume is also required by the regulation. The reduction in sulfur contributes directly to a 90% reduction in SOx emissions, and also helps to reduce PM_{10} emissions somewhat. According to the California Air Resources Board, the reduction in aromatics (which were around 30%) will further reduce PM_{10} and NOx emissions. Diesel NOx emissions are projected to be reduced by about 9% by this measure, while particulate emissions would be reduced about 25%.

South Coast Air Quality Management District Smoke Enforcement Program. Under an interagency agreement between the South Coast Air Quality Management District and the California Highway Patrol, a limited number of California Highway Patrol officers have been assigned full-time to smoke enforcement activities. These officers patrol freeways and other roads in the South Coast Air Quality Management District, observing and citing vehicles which emit excessive smoke. In addition, the District has a widely publicized program encouraging motorists to call a toll-free number to report smoking vehicles, including trucks.

Cited vehicles must be repaired to reduce their smoke emissions. Since cited vehicles are typically "gross emitters" of PM_{10} and VOC, their repair should greatly reduce PM_{10} and VOC emissions from cited vehicles. Furthermore, the possibility of a citation serves to encourage truck owners to improve their maintenance practices. Both effects contribute to lower VOC and PM_{10} emissions than would otherwise be experienced. These benefits are not presently quantifiable, however.

California Air Resources Board/California Highway Patrol Smoke Enforcement and Anti-Tampering Program. This program was mandated in SB 1123. Under the program, trucks pulling into California Highway Patrol weight and safety inspection stations are visually checked for smoke emissions, and apparent high emitters are flagged out of line for a confirmatory test, after which they may be cited. Anti-tampering inspections of engine emission controls are also carried out. Cited vehicles are required to undergo repair to reduce their smoke emissions. Both the citations themselves and the desire to avoid them are expected to help improve

general vehicle maintenance and sensitivity to excess smoke emissions in the heavy-duty truck fleet. The specific extent of these benefits is not yet quantifiable, however.

4.6.1.2 Landfill Equipment Emissions

Exhaust pollutant emissions from the Diesel engines used in landfill and waste-handling equipment at the Eagle Mountain Mine site will contribute to the cumulative environmental impact of the project.

Low Sulfur/Low Aromatic Fuel. California Air Resources Board regulations limiting the sulfur and aromatic content of motor vehicle Diesel fuel came into effect in 1993. This regulation requires landfill equipment to use low-sulfur/low aromatic fuel. Therefore, the project design includes the use of low-sulfur/low aromatic fuel for landfill equipment and emission estimates for the Proposed Project with and without mitigation reflect the expected emission reductions associated with the use of this fuel. Since landfill equipment engines are technically similar to those used in trucks, the reduction in emissions will probably be of the same order as that projected for truck engines by the California Air Resources Board. The reduction in sulfur will reduce SOx emissions by 90%, and will reduce PM_{10} emissions by roughly 10% of anticipated PM_{10} emissions. Based on California Air Resources Board's projections for truck engines, the reduction in aromatic content should reduce NOx emissions by about 9%, and lead to a further 10-15% reduction in PM_{10} emissions.

Federal Construction Equipment Standards. In 1994, the EPA published its final regulation setting standards for construction equipment. These regulations will go into effect in 1996 and limit NOx to 6.9 g/Bhp-hr and PM_{10} to 0.4 g/Bhp-hr. Landfill equipment meeting these regulations should be available this year. Consequently, equipment purchases should be limited to equipment meeting these requirements. Exceptions will be the hostling vehicles, liner/cover haul trucks, and water tankers, which should be purchased with on-highway certified engines.

4.6.1.3 Landfill Gas Generation and Flare Emissions

Fugitive landfill gas emissions from the landfill surface and combustion emissions from the flaring of landfill gas will contribute to the cumulative environmental impact of the project. These emissions will be regulated by the federal New Source Performance Standard for landfills (40CFR, Part 60, Subpart WWW) and South Coast AQMD XIII, which requires BACT, and Rules 1150.1 and 1401. The first two regulations directly limit emissions from landfills while the latter one will require the analysis and limit the emissions of toxic compounds from any new or modified facility. In addition to compliance with these rules, Mine Reclamation Corporation has committed to three additional mitigation measures, discussed below, to reduce landfill gas generation and combustion impacts.

If the landfill gas generation rate exceeds 10 million cubic feet per day, either an energy recovery system should be installed to replace the flares, or the flares should be equipped with oxidation catalysts. As final decisions on energy recovery options have not been made, this analysis focuses only on control of emissions from the flares.

Oxidation catalysts can oxidize concentrations of carbon monoxide and hydrocarbons in the flare exhaust to form carbon dioxide and water. In order to avoid catalyst damage, it may be necessary to modify the flares to reduce stack exit temperatures to 850°F or less. The catalysts will consist of blocks of platinum-coated ceramic honeycomb. A number of these blocks will be mounted in a stainless steel frame to produce a porous wall through which all of the exhaust gas will pass. Each catalyst will be located a sufficient distance downstream of the flare burner so as to receive cooled exhaust gas at the temperature which is optimum for catalyst efficiency. The design control efficiency of the catalyst will be 90% for carbon monoxide and 50% for non-methane hydrocarbons.

If the landfill gas generation rate exceeds 50 million cubic feet per day and it is determined that an energy recovery facility is not feasible, the flares should be additionally equipped with urea injection systems (or the equivalent). These systems will inject aqueous solutions of urea into areas of 1400°-1750°F temperature regime upstream of the oxidizing catalysts. The urea solution will react with oxides of nitrogen in the flare exhaust to produce molecular nitrogen, carbon dioxide, and water. The control effectiveness of urea injection for oxides of nitrogen from a flare is estimated at 30% or higher. For this analysis, the lower end of this range is used to conservatively overestimate emissions.

To reduce fugitive landfill gas from escaping the landfill, as part of the South Coast Air Quality Management District Rule 1150.1 monitoring requirements, MRC should conduct daily monitoring over the surface of the landfill to detect landfill gas leaks. If a landfill gas leak is discovered, MRC should add cover material and/or install additional gas extraction wells and/or adjust the vacuum pulled in existing wells to reduce measured fugitive landfill gas concentrations to levels below those required by Rule 1150.1.

4.6.1.4 Fugitive Dust

Fugitive dust emissions due to the handling or passage of vehicles over paved and unpaved surfaces will contribute to the cumulative environmental impact of the project. Primary sources will include the movement of vehicles over project roads, the excavation of tailing and overburden, the spreading and compaction of cover and liner material, the construction of access roads, and the installation of leachate/condensate and landfill gas piping systems. The following control measures are included as project design features in order to meet the requirements of South Coast AQMD Rule 403.

Road Surfaces. Fugitive dust emissions from road surfaces should be mitigated by either water application, aggregate and dust palliative application, or paving. For roads which are under construction or are very temporary (i.e., used less than 30 days), such as the surface of the working face of the landfill used by hostling vehicles or temporary staging areas, frequent watering and use of chemical dust suppressants should be used to maintain surface moisture contents at levels that minimize dust generation. The frequency and amount of water required for dust control will depend on the activity rate in the area in question and the evaporation rate.

Chemical dust suppressants should be applied to the surface of unpaved transitional roads (i.e., used more than 30 days) to control fugitive dust. Transitional roads are those which will be periodically reconstructed, such as the short sections of road that will connect the permanent haul road with the working face of the landfill. Upon completion of periodic reconstruction, the road should be surfaced with crushed stone. This material should be compacted and sprayed with chemical dust suppressant. The solution application rate will depend on the type of dust suppressant used (e.g., asphalt emulsion, petroleum resin, acrylic cement, etc.) and concentration of the solution. Demonstration sections of treated roadway should be visually inspected on a daily basis to determine the durability of the various chemical dust suppressants used. The chemical dust suppressant which is most cost-effective in maintaining negligible visible emissions should be chosen for ongoing project use. In addition to transitional roads, the permanent haul road which connect the intermodal yards to the working face of the landfill, intermodal yards, and truck marshaling yards should also be constructed of compacted crushed rock and treated with a chemical dust suppressant. Due to the weight of the vehicles that will use these roads and yards, for durability purposes it is infeasible to pave the permanent haul road, intermodal yards, and truck marshaling yards.

For onsite light-duty vehicle traffic roads which will be permanent (i.e., used for more than one year), such as the main access roads from the town of Eagle Mountain to the intermodal yards, paving should be used to control fugitive dust. In the construction of these roads, suitable aggregate should be used to provide an acceptable structural base to support the transfer trucks that will use the roads and asphalt concrete should be applied as an overlay. As necessary, paved roads should be cleaned with vacuum sweepers or flushed with water to minimize the levels of loose surface material which produces fugitive dust emissions.

For offsite paved roads, all trucks should have covered loads or maintain a two-foot freeboard height to minimize the amount of material that spills onto the roadway surface. This requirement will reduce the amount of material surface loading on offsite paved roads which, in turn, will result in lower dust emissions from offsite paved road travel. In addition, all waste haul trucks which leave the permanent or transitional roads should pass through a wheel-washing station prior to leaving the site to minimize the amount of material tracked onto offsite paved road surfaces.

Tailing and Overburden Excavation. Fugitive dust emissions from the excavation of coarse and fine tailing and overburden should be mitigated by prewatering. The moisture content which achieves nearly dustless conditions upon excavation and loadout of material should be used as a standard measure. All inactive areas disturbed by excavation activities should be compacted and treated with a chemical dust suppressant or covered with a fabric cover to minimize wind erosion.

Material Processing Plants and Waste Handling. Particulate emissions from the material processing plants will contribute to the cumulative environmental impact of the project. These emissions will be regulated by U.S. Environmental Protection Agency new source performance standards and several South Coast Air Quality Management District regulations. The material processing plants should be equipped with water sprays and enclosed transfer points vented to a dust collector to control fugitive dust emissions.

As the solid waste is comparatively damp and large in particle size, no particulate emissions have been observed from the handling or processing of this material at operating landfills, and none are expected with the Proposed Project.

Miscellaneous Sources. Fugitive dust from other excavation activities should be mitigated by surface prewatering. These activities include the clearing of sloughed material on pit benches, the excavation of leachate/condensate and landfill gas pipeline ditches, and the maintenance of onsite road surfaces. A high-pressure pump mounted on one of the water trucks should be used to spray the surface of bench material prior to removal. Rear spray water trucks should be used to prewater areas prior to pipeline excavation, reconstruction of transitional roads, and general road grading and ditch cleaning. All inactive areas disturbed by bench clearing, excavation, or road-building activities should be compacted and treated with a chemical dust suppressant to minimize wind erosion.

4.6.1.5 Miscellaneous Sources

These sources include the emergency generators, maintenance paint shop, fuel storage and dispensing operations, and locomotive sand silo. These sources will utilize control equipment required by SCAQMD regulations. Due to the relatively minor emissions associated with these sources (i.e., less than 2 tons/yr), there are no additional mitigation measures proposed for these sources other than those required by SCAQMD regulations.

4.6.2 Additional Mitigation Measures

4.6.2.1 Locomotive Emissions

Diesel engine exhaust emissions from railway locomotives will contribute to the cumulative environmental impact of the project. These emissions will result from the operation of Southern Pacific Railroad (SP) locomotives* hauling the waste from the Los Angeles/Orange County area to the landfill site. The first portion of this trip, from the origin to the Ferrum Junction siding, will be along the normal SP tracks. The second portion, from the junction to the landfill will be on the spur line of the Eagle Mountain Railway. However, all locomotive operations will be handled by SP. Emissions from the Southern Pacific locomotives are not under Mine Reclamation Corporation's direct control, and dedicated locomotives for the spur line from Ferrum Junction to the landfill will not be available until there are at least four trains per day arriving at the landfill.

The emissions from the Proposed Project Without Mitigation have been computed using emission factors for current generation locomotives. Future locomotives will have lower emissions, but the exact level of these emissions is not certain until ongoing regulatory action is completed. The potential regulation of locomotive emissions stems from the 1990 Clean Air Act Amendments. One part of these amendments directed the EPA Administrator to promulgate emission standards for locomotives and for new engines in locomotives within five years from the passage of the amendments. Those amendments also preempted states from passing emission standards for new locomotives and new engines in locomotives. The deadline for promulgating the final locomotive regulations, November 15, 1995, has already passed and EPA's first step, the publishing of a notice of proposed rulemaking (NPRM), has not yet taken place. The regulations are under development, however, and the publication of the NPRM is expected in the first half of 1996.

In February 1994, EPA published an NPRM for a federal implementation plan (FIP) for three areas in California. Although a final FIP was never published in the *Federal Register*, due to an act of Congress, the FIP proposal contained a discussion of EPA's directions on locomotive regulations. This provides some insight into the level of control expected by future regulations. The main points of these regulations are listed below.

- A standard for new locomotives that are manufactured between January 1, 2000, and December 31, 2004, which would reduce NOx emissions by 50%.

---

* The operations described in this section would not be changed by the proposed merger between Union Pacific and Southern Pacific.

- A standard for new locomotives that are manufactured on or after January 1, 2005, which would reduce NOx emissions by 65% and PM_{10} emissions by 50%.

- A standard for locomotives manufactured prior to January 1, 2000, which would reduce NOx emissions by one-third the first time that the locomotive engine is remanufactured after January 1, 2001.

- All the emission reductions listed above would have to be met throughout the remaining life of the locomotive, including rebuilt locomotive engines.

CARB has previously considered the imposition of regulations for locomotives, commissioning Booz-Allen to conduct a study which evaluated the available control technology and recommended an overall averaging approach. However, in its 1994 SIP, CARB rejected this approach and proposed a measure that could be met by a conventional regulatory approach. CARB's locomotive control measure placed responsibility for emission control on EPA. One special element of the SIP measure was a fleet-average standard for the SCAB. This fleet-average standard, which would begin in 2010, will require each railroad operating in the SCAB to meet a fleet-average standard which is equivalent to operation with a fleet that consisted only of locomotives which were manufactured on or after January 1, 2005. CARB estimated that this would reduce locomotive emissions by 67% from the emissions that would otherwise occur in 2010. This SIP measure has been used to compute the locomotive emissions in the mitigated case.

Some of the control technologies that have potential application to locomotive engines are listed below. Some of these technologies will be used to comply with the expected locomotive regulations or might be available as voluntary mitigation methods. Others have the potential to reduce emissions, but are not currently practicable or cost effective for routine operation in locomotives.

1. Reduction in idling emissions by shutting down locomotives whenever they will not be needed for at least one hour.

2. Use of low-sulfur, low-aromatic fuel meeting California requirements for motor vehicle Diesel fuel.

3. Diesel engine emissions controls such as retarded injection timing, low-temperature aftercooling, combustion modifications, and revised engine speed-load schedules for existing locomotives.

4. Use of electronic fuel injection to improve engine control for lower emissions.

5. Use of catalytic trap-oxidizer systems on new or existing Diesel locomotives to reduce PM_{10} and VOC emissions.

6. Use of selective catalytic reduction on new or existing Diesel locomotives to reduce NOx emissions.

7. Use of alternative "clean" fuels, particularly liquefied natural gas (LNG), in locomotive engines.

8. Electrification of railway operations.

9. Fuel cells.

Operational Measures to Reduce Emissions. Locomotive engines are traditionally left idling when they are not in use - which is typically more than 50% of the time. By issuing instructions to the engineers to shut down the engines whenever they will not be needed during the next hour, it will be possible to reduce this idling time, with a savings of approximately 60 gallons of fuel per locomotive per day. (The one hour period is based on the need to reduce engine wear which would be associated with excessive starts, and reducing emissions during extended idling.) In the study of locomotive emissions done for CARB by Booz-Allen, idling emissions were found to account for 23% of the PM, 16% of the NOx, 38% of the CO, 44% of the VOC, and 15% of the SO_2 emitted by locomotives. Reduced idling could reduce the total emissions by percentages close to these levels.

Other operational measures to minimize locomotive fuel consumption would also have the effect of reducing emissions. These would include regular preventive maintenance of the engines, with special attention given to fuel injector performance. The SP is presently conducting a routine smoke monitoring program as part of an agreement with the SCAQMD. This program is effective in identifying faulty fuel injectors. The replacement of these injectors helps to ensure that the engine is performing at peak efficiency, and that VOC and PM_{10} emissions are as low as possible. In addition to these direct benefits, an aggressive preventive maintenance program will help ensure locomotive reliability, reducing the need to assign extra locomotives because of the possibility that one or more units is in substandard condition. This will further reduce fuel consumption and pollutant emissions.

Low Sulfur/Low Aromatic Fuel. CARB regulations limiting the sulfur and aromatic content of Diesel fuel do not apply to fuel used in locomotives. Typical railroad Diesel fuel has a sulfur content as high as 0.5% by weight, and 30-40% aromatic hydrocarbons by volume. Use of Diesel fuel meeting CARB sulfur standards would reduce SO_2 emissions by about 80% since the average sulfur content is about 0.25% by weight. Particulate emissions would also be reduced by about 0.07 g/Bhp-hr, or roughly 15-30%, due to the reduction in sulfate particles. This would add about $0.02 per gallon to the cost of the fuel, or about $3.50 per pound of SOx eliminated. Use of fuel containing no more than 10% aromatic hydrocarbons, as well as low sulfur, should further reduce PM_{10} and possibly NOx emissions. Estimates of the emissions benefit for on-highway truck engines are of the order of 9% reduction in NOx and 10-15% reduction in PM_{10}.

There has only been limited testing of low-aromatic fuels on locomotive engines. Although NOx emissions were reduced from 11.21 g/Bhp-hr to 9.94 g/BHP-hr on a GE 12-7FDL engine, there was virtually no change in NOx emissions on an EMD 645E3B engine. With the low-sulfur, low-aromatic fuel, NOx emissions were 10.44 g/Bhp-hr as compared to 10.46 g/Bhp-hr with normal Diesel fuel. On the GE engine, PM_{10} emissions decreased from 0.19 g/Bhp-hr to 0.18 g/Bhp-hr when low-sulfur, low-aromatic fuel was substituted for Diesel fuel. On the EMD engine, the PM_{10} emissions actually increased (from 0.15 to 0.17 g/Bhp-hr) for this fuel substitution. Although there is no fundamental reason why the low-sulfur, low-aromatic fuel should not have the same effect in a locomotive Diesel that it has in an on-highway Diesel, additional data are required to confirm that this fuel produces a consistent benefit in locomotive engines. Low-aromatic fuel is anticipated to increase fuel price by about $0.10 to $0.20 per gallon.

Emission Control Retrofits. The following measures will be used to comply with the proposed EPA regulations for remanufactured locomotives. These changes will be required only at the point when the engine is remanufactured.

1. Upgrade fuel injection systems to current technology (reduce fuel consumption 2-2.5%, reduce smoke, PM_{10} and VOC emissions).

2. Retard fuel injection timing by a fixed 4-6° increment (reduce NOx probably 35-40%, reduce power, increase fuel consumption, smoke, PM_{10}).

3. Upgrade turbochargers to current technology (reduce fuel consumption, smoke, and PM_{10}, increase power output).

4. Install separate-circuit aftercooling to reduce charge air temperature (reduce fuel consumption, NOx, smoke, and PM_{10}, increase power output).

5. Modify engine and dynamic brake speed schedules, introduce multi-step dynamic brake speeds (reduce fuel consumption, smoke, and emissions).

6. Add eddy-current clutch for radiator fan (reduce parasitic loads and fuel consumption).

The cumulative effect of these standard changes should be to reduce fuel consumption by about 10%. Smoke (and presumably PM_{10} and VOC emissions) should also be reduced substantially by these changes. Retarding the injection timing 4° and lowering the intercooler temperature have been shown to give 20-30% reductions in NOx emissions, depending on the locomotive.

Trap-Oxidizer Systems. Catalytic trap-oxidizers have been shown to be highly effective in reducing Diesel engine emissions of PM_{10}, VOC, and toxic air contaminants. Reductions of 80-90% in particulate matter and 50-80% in VOC are typical. A trap-oxidizer system could thus be especially effective in counteracting the

increase in PM_{10} and VOC emissions which is otherwise likely to result from retarding injection timing for NOx control. Low-sulfur fuel is required to ensure that the platinum-group catalysts do not create a problem with excessive sulfate emissions, and fuel consumption is typically increased by 2-5%.

The difficulty of ensuring reliable regeneration and adequate durability has prevented trap-oxidizer deployment in highway vehicles (except for a limited number of Mercedes-Benz passenger cars) up to the present time. With their high load factors and predictable duty cycles, locomotives could be good candidates for trap-oxidizer application. To date, however, trap-oxidizers have not been demonstrated on any engine approaching that of a locomotive in size. Trap-oxidizer size is limited by thermal stresses and manufacturing constraints. The large engine size and high exhaust flow rate of a locomotive would require that a large number (10-20) of trapping elements be arranged in parallel. While this poses no problem in principle, the resulting volume, heat radiation from the hot surfaces, etc. could create a difficult packaging problem within the confined space of a locomotive.

Questions about efficacy, durability, impact on engine performance, reliability, and safety of trap-oxidizers in locomotive service would have to be answered before this measure could be considered feasible for the Proposed Project.

Selective Catalytic Reduction. Selective catalytic reduction (SCR) control technology can reduce NOx emissions up to 90%. The technology involves injecting ammonia in the post-combustion region upstream of a catalyst. The ammonia reacts with NOx in the combustion products and forms nitrogen and steam. The catalyst assists this process by causing the reaction to occur at lower temperatures.

SCR technology is currently being used to control NOx emissions from electric utility boilers, refinery heaters and boilers, gas-fired IC engines, and gas-fired gas turbines. In addition, SCR technology has been installed on a number of spark-ignited engine installations and a few pilot injection dual fuel engines. However, SCR technology has been applied to fuel oil-fired Diesel engines as a control alternative for NOx emissions only on a very limited basis.

There are only a few commercial projects in which SCR has been applied to Diesel engines. In the United States (Massachusetts), there is currently a 5 MW Diesel engine project on which SCR is being used as a NOx control technology. This unit is equipped with a Steuler molecular sieve catalyst system. However, this unit is completely different from typical locomotive Diesel engines. The Massachusetts engine is basically a Diesel-ignited, natural gas-fired engine and, therefore, does not run solely on low-sulfur Diesel fuel oil. The engine has been in operation for several years and to date has accumulated over 7,000 hours of operation on Diesel fuel. The operator indicates that the SCR unit is operating satisfactorily and is having no difficulty achieving the guaranteed 90% NOx reduction. However, severe system control problems were experienced at startup. Although ammonia slip is not measured, there is no detectable ammonia odor.

One engine manufacturer (SWDiesel, or SWD) has indicated that there is a 6 MW dual fuel engine in West Germany which is equipped with the Steuler SCR system. Like the engine in Massachusetts, the 6 MW dual fuel engine operates chiefly on natural gas. SWD has also identified one small mine locomotive Diesel engine, commissioned in March 1988, which has also been equipped with an SCR system. This engine operates intermittently and for a limited number of hours.

Kauai Electric Division of Citizens Utilities Company is operating an SCR-equipped 8 MW Diesel engine in baseload service on the island of Kauai. This installation has been in operation for four years, provides a 60% NOx reduction and has experienced no fuel-related operational problems.

Haldor Topsoe of Denmark has developed a titanium oxide monolith catalyst that has been demonstrated in fuel oil service on three residual oil-fired ship engines. The Haldor Topsoe DENOX SCR system was installed on the main engine of two Korean vessels for testing under controlled conditions. The ships' engines are switched to low-sulfur Diesel fuel prior to startup of the SCR unit, and the SCR unit is completely bypassed during residual fuel oil firing. These engines are 10,680 hp slow-speed Diesel engines. Typical operation of these SCR units will be approximately 12-14 hours each month. NOx removal efficiency has been measured at over 90%.

Nitrogen Nergas Corporation has demonstrated a base metal catalyst on several types of Diesel-powered engines in Southern California. The Nitrogen Nergas SCR unit has been applied to Diesel-powered dredge barges, standby engines and drilling rigs up to approximately 6,000 hp in size. The applications include three Caterpillar Diesel engines on an oil drilling rig in Ventura County; three 1,200 hp to 400 hp Diesel engines manifolded to a single SCR unit on a dredge barge; three large standby Diesel engines at Xerox Corporation; a 600 hp Caterpillar Diesel water pump engine owned by Eastern Municipal Water District; and two rock crushers. The longest operating experience is on the dredge barge engine, which has accumulated approximately 8,000 hours of operation in 18 months. These applications are more similar to marine Diesel engines because they operate on 100% Diesel fuel. However, they are not directly comparable because some marine Diesels are nearly twice the size of the largest engine (or larger) on which the SCR system has been demonstrated and because the engines have not been in long-term, continuous service.

In addition to the lack of demonstrated full-time, continuous Diesel service, one of the most significant unknown operating factors associated with this technology is catalyst plugging that decreases the amount of catalyst surface area available for the reaction to proceed and eventually renders the catalyst inactive. SO_2, which is formed by the oxidation of SO_2, reacts with the ammonia to form ammonium bisulfate (a particulate emission) which could cause fouling of the SCR system. This problem is not as acute with a dual-fuel engine, because long periods of operation on Diesel fuel do not occur. The Nitrogen Nergas catalyst system uses a guardbed configuration to remove some of the particulate sulfate from the exhaust stream before it comes in contact with

the catalyst material. This seems to be effective in extending catalyst life by protecting it from substances that would cause plugging and poisoning. However, it adds additional complexity to the system and increases required maintenance.

Other disadvantages to SCR systems include difficult ammonia control problems, increased maintenance costs to clean the catalyst, high capital and operating costs, and the necessary handling and storing of ammonia. Depending upon the formulation of the catalyst, the spent catalyst material may be considered hazardous waste and would contribute to the shortage of available landfill sites for this material. In addition, the presence of sulfur in the Diesel fuel may result in the formation of ammonium bisulfate and contribute additional particulate emissions.

As discussed above, there is a great deal of uncertainty about the reliability of SCR systems in Diesel engine applications. The ammonia handling requirements and the complexity of auxiliary equipment associated with SCR systems further enhance the concerns about the operation and maintenance of this control technology. Effective SCR operation requires close control of ammonia injection rates as engine operating conditions vary.

Several operators of Diesel engines equipped with SCR have described serious ammonia control system problems experienced on startup that made it difficult to maintain stable and consistent NOx emission reductions. While these problems were eventually resolved, they are some of the potential problems that add to the uncertainty regarding system performance and cost. Other potential problems relate to uncertainty regarding quantities of catalyst material required, ammonia injection rates, loss in catalyst efficiency and increases in back pressure.

Based on the status of SCR technology as applied to Diesel engines, SCR for the Eagle Mountain Railway Diesel locomotives cannot be considered technically feasible at the present time.

Alternative Fuels. Use of alternative fuels, particularly LNG, could significantly reduce locomotive emissions, according to the Eagle Mountain Landfill Transportation Study published by Southwest Research Institute in March 1993. Locomotive engines using LNG are available on a demonstration basis. In addition, a large number of high-powered, medium-speed, lean-burn engines are presently in use in stationary applications, burning natural gas and other gaseous fuels. These engines closely resemble locomotive engines in their technical characteristics, and in some cases are directly derived from Diesel engines which are used in locomotive service. There have also been some laboratory experiments using methanol in two-stroke locomotive engines. However, the economics of natural gas are more favorable, the technology is better developed, and the potential for reducing overall emissions is greater.

Diesel engines can be modified to use natural gas in either of two ways. The first is *dual fuel* operation, in which the natural gas charge is ignited by injecting a small amount of Diesel fuel. These engines exhibit good performance and low emissions at

high loads, but HC and CO emissions tend to increase dramatically under low-load conditions. Dual-fuel engines normally idle on Diesel fuel alone. The alternative is *spark ignition* operation, in which the Diesel injector is replaced by a spark plug (or spark plug and prechamber, in larger engines), and the engine runs on 100% natural gas. Unlike dual-fuel engines, these engines require throttling to control power output, and tend to have relatively high light-load fuel consumption. Because Diesel combustion is completely eliminated, however, emissions can be very low. NOx emissions less than 1.5 g/Bhp-hr are routinely demonstrated using this technology in stationary source applications. This can be compared to 12-14 g/Bhp-hr for present uncontrolled locomotive engines, and a probable minimum of 5-6 g/Bhp- hr with the maximum feasible Diesel NOx control. Particulate emissions (which tend to go up dramatically with Diesel NOx control) are also reduced to very low levels using this technology. A final approach for use of natural gas in Diesel engines, which is currently under development, uses direct injection of natural gas (DING). In these engines, the LNG is injected directly into the combustion chamber and the combustion process is similar to that with pure Diesel fuel. However, the NOx levels from this process are higher than those from the spark ignited or dual fuel approaches.

Burlington Northern is currently demonstrating LNG locomotives in coal train service. These locomotives are rebuilt EMD SD40-2 locomotives which achieve 3.2 g/bhp-hr NOx emission in their highest throttle setting. These engines are dual fuel engines. Both Santa Fe and Union Pacific have demonstration projects with spark-ignited LNG engines for yard service. The NOx emissions for these engines are about 2 g/bhp-hr. Union Pacific is planning to demonstrate a line-haul locomotive which uses high-pressure direct injection of natural gas.

The use of an alternative fuel in Diesel locomotive engines is certainly available for demonstration purposes, but it would have to be evaluated further before it could be considered feasible for routine use in this project. An initial feasibility study regarding the use of alternative locomotive fuels was prepared as required by a mitigation measure contained in the previous EIR/EIS. However, such a demonstration project could not occur until there at least four trains per day going to the site. This would allow the use of dedicated locomotives which would be available for the demonstration project. Consequently, the feasibility study should be updated prior to this time to ensure that it contains the most accurate available information.

Electrification. Technology for railway electrification is readily available -- both EMD and General Electric offer electric locomotives -- and has been widely adopted in other countries. Electrification also offers some significant advantages in the area of locomotive power and reliability, maintenance requirements, and operational characteristics. The major impediments to its use in the U.S. are the high costs of the catenary cable systems to supply the electricity, plus the associated costs of extensive modifications to railway signal systems to make them compatible with electric traction. The need to purchase substantial quantities of new electric locomotives is also a deterrent -- electric locomotives are more than twice as expensive as current Diesel-electrics.

Although electrification of main lines has been discussed by the Southern California Association of Governments and the South Coast Air Quality Management District, the current approach to locomotive emission controls in the SIP is not electrification. Thus, this measure is not available for this project.

Fuel Cells. The SCAQMD created a Locomotive Propulsion Systems Task Force (LPSTF). The LPSTF commissioned a study by JPL to define a fuel cell system that could be used as a first generation demonstration project in locomotives. JPL recommended* a three-phase demonstration project which would take 7.5 to 8 years. The goal of this long-term demonstration project is necessary to provide a "final evaluation of the cost and technical viability of locomotive fuel cell power plants in industrial operation." Until the completion of this kind of demonstration project, fuel cells cannot be considered an alternative power plant for locomotives.

4.6.2.2 Landfill Equipment Emissions

As discussed above, exhaust pollutant emissions from the Diesel engines used in landfill and waste-handling equipment at the Eagle Mountain Mine site will contribute to the cumulative environmental impact of the project. Conceivable additional measures which could be taken to mitigate this impact include the following:

1. Operational measures, such as limiting time spent with the engine idling by shutting down equipment when not in use;

2. Regular preventive maintenance to prevent emission increases due to engine problems;

3. Purchase and use of turbocharged and intercooled Diesel engines, when available, with retarded injection timing;

4. Purchase and use of low-emitting Diesel engines meeting California emission standards for highway trucks;

5. Use of catalytic trap-oxidizer systems on Diesel engines;

6. Use of alternative "clean" fuels such as methanol, LPG, or compressed natural gas in landfill equipment engines; and/or

7. Electrification of landfill equipment operations.

---

* G.R. Galvas, G.E. Voecks, N.R. Moore, J.F. Ferrall, and P.R. Prokopius, "Fuel Cell Locomotive Development and Demonstration Program, Phase One: Systems Definition," Final report JPL D-12087, JPL, February 1995.

Operational Measures to Reduce Emissions. Operational measures to conserve fuel and reduce emissions include minimizing engine idle time, using only the number of machines required for a given volume of waste handled, and minimizing queuing time for loading and unloading through efficient scheduling. Idle time should be minimized by instructing equipment operators to shut down their machines rather than letting them idle for more than five minutes. Operational managers should be instructed to schedule machines and operators to match the anticipated waste volume, and to match the numbers of container haulers to the intermodal rail capacity at each end to avoid excessive queue formation. This will help to reduce operating costs and wear and tear on equipment as well as emissions.

Preventive Maintenance. All landfill equipment should be subject to regular preventive maintenance in order to detect and prevent mechanical problems which can lead to increased emissions. These mechanical problems include clogged air filters, worn or damaged turbochargers, and problems with the fuel injection system. Equipment operators and supervisors should be instructed to report any evidence of excessive smoke or other symptoms so that the equipment can be scheduled for maintenance in a timely fashion. Smoke opacity measurements should be made using an end-of-stack opacimeter upon receipt of the equipment, and at each scheduled service interval or unscheduled engine maintenance thereafter. A record of each machine's opacity measurements should be kept as part of its maintenance record. This will allow maintenance personnel and supervisors to identify both short-term and long-term changes in smoke opacity which would signal the need for maintenance to reduce emissions.

Turbocharging/Intercooling/Retarded Injection Timing. NOx and particulate emissions from Diesel engines can be reduced through a combination of turbocharging, intercooling (to the lowest temperature practical), and retarded injection timing, especially at high loads. Turbocharged and intercooled engines should be chosen for all major Diesel equipment purchased for use in the landfill, unless (a) there are no suitable equipment models available with turbocharging and intercooling, either as standard equipment or as an available option; or (b) the manufacturer demonstrates that the engine achieves similar emissions performance by some other means. This latter exception would include on-highway certified engines, or engines meeting federal emissions standards for construction equipment.

Except in the case of engines which are already emission- controlled (in which timing is normally retarded already), all Diesel engines in landfill equipment should have their fuel injection timing adjusted to a retarded setting. The degree of timing retardation used should be chosen to reduce NOx as much as possible, while minimizing the increase in smoke, PM_{10}, and VOC emissions due to the retarded timing. The optimal degree of timing retardation will vary from one engine model to another, and should be selected in consultation with the engine manufacturer.

Use of On-Highway Engines. In addition to turbocharging, low-temperature intercooling, and retarded injection timing, Diesel engines certified to meet

EPA/CARB's 1998 emission standards for on-highway vehicles will exhibit a number of other emissions-related modifications and control technologies. These will generally include electronic control of fuel injection timing and quantity, increased fuel injection pressure, and optimization of piston and combustion chamber design to reduce emissions. These engines will be required to emit no more than 4.0 g/Bhp-hr NOx and 0.10 g/Bhp-hr of particulate matter. However, the California Air Resources Board (CARB), the EPA, and heavy-duty engine manufacturers signed a Statement of Principles regarding future emission controls on heavy-duty engines. This statement was formalized by an advanced notice of proposed rulemaking (ANPRM) published in the August 31, 1995 Federal Register (60 FR 45580). That ANPRM proposes two separate standards for 1994 model year on-road, heavy-duty Diesel engines: (1) 2.4 g/bhp-hr for the sum of non-methane hydrocarbons (NMHC) and NOx, or (2) a standard of 2.5 g/bhp-hr for the sum of NMHC) and NOx with a cap of 0.5 g/bhp-hr for NMHC. Either of these standards should be equivalent to a NOx standard of 2 g/bhp-hr. Achieving these targets will require extensive engine optimization, so that these on-highway certified engines will generally exhibit lower emissions overall than off-highway engines retrofitted with specific emissions controls.

Among the landfill equipment, the hostling vehicles, liner/cover haul trucks, and water trucks will more closely resemble on-highway trucks, and should be equipped with on-highway certified engines if feasible. It may also be possible to use these engines (or very similar engines utilizing nearly the same technology) in other landfill equipment such as the dozers, compacters, loaders, and scrapers. This will not always be possible, however, due to the important differences in duty cycle, torque rise requirements, engine mounting, and cooling requirements between construction machinery and on-highway trucks. The feasibility of using an on-highway certified engine should be reviewed for each piece of landfill equipment, and such engines should be used unless (1) there is no suitable engine available or (2) the mounting and installation requirements, or duty-cycle limitations, make it infeasible to use any available engines in the specific equipment under consideration.

Use of Off-Road Engines

In the Statement of Principles discussed in the section on Use of On-Highway Engines, the California Air Resources Board (CARB), the EPA, and heavy-duty engine manufacturers have agreed to work towards a similar statement of principles for off-road engines. According to the ANPRM such an agreement was expected by October 1995. However, such an agreement had not been reached by the end of 1995. Although there are no proposed rulemakings proposed for off-road engines, the November 1994 state implementation plan (SIP) for California proposes a measure which would reduce NOx levels on off-road engines to 2.5 g/bhp-hr from the current standard of 6.9 g/bhp-hr. Because of the uncertainty over the ultimate future standard for off-road engines a value of 4.0 g/bhp-hr has been assumed for this analysis. As with the on-highway engines, a value of 0.10 g/bhp-hr of particulate matter was assumed for the off-road engines.

The actual emission levels for both on- and off-road engines have been taken as a multiple of the standard, as is currently assumed in EPA's motor vehicle inventory model, MOBILE5a.

Catalytic Trap-Oxidizers. Catalytic trap-oxidizers have been shown to be highly effective in reducing Diesel engine emissions of PM_{10}, VOC, and toxic air contaminants. Reductions of 80-90% in particulate matter and 50-80% in VOC are typical. These systems could thus be especially effective in counteracting the increase in PM_{10} and VOC emissions which is otherwise likely as a result of retarding injection timing for NOx control. Low-sulfur fuel is required to ensure that the platinum-group used by catalysts do not create a problem with excessive sulfate emissions.

The difficulty of ensuring reliable regeneration and adequate durability has prevented trap-oxidizer deployment in highway vehicles (except for a limited number of Mercedes-Benz passenger cars) up to the present time. With their higher load factors and predictable duty cycles, construction and mining machines are excellent candidates for trap-oxidizer application, and it has been employed successfully in several mining operations. To date, trap-oxidizer usage has not been demonstrated in landfill operations, however, and there is presently no commercial trap system available for landfill equipment. In addition, trap-oxidizer use would raise a number of questions concerning effects on safety, performance, reliability, and durability of landfill equipment. These questions would have to be answered before trap-oxidizer systems could be considered feasible for installation on Diesel fueled landfill equipment.

Alternative Fuels. Replacement of Diesel engines with engines using alternative fuels such as methanol, LPG, or natural gas could conceivably reduce pollutant emissions. At present, no such engines are available in any of the equipment types planned to be used in landfill operations. A number of engines using methanol and compressed natural gas are being tested for use in on-highway trucks and urban buses with engine ratings from 240 to 300 hp. This is too low a power rating for most of the landfill equipment planned.

Additional engines are expected to be introduced in response to the future federal standards for non-road Diesel equipment. These engines could be used directly in the hostling vehicles, and could conceivably be adapted for use in dozers, compactors, and other items of landfill equipment. However, because the EPA has not set a specific time schedule for the development of new regulations, it is impossible to forecast when additional alternative-fuel engines for landfill equipment will be available.

Electrification. Replacement of Diesel or alternative-fuel prime movers with electric motors would produce virtually a 100% reduction in exhaust emissions. Successful electrification of landfill operations requires that a reliable supply of electric power be provided to the equipment at all times. Battery systems capable of delivering the

power and energy densities required for landfill equipment do not yet exist. This limits the range of equipment which could feasibly be electrified to those which do not move, or which have only a very limited range of motion. These would include the container unloading cranes in the intermodal rail yards, and the belts which may be used for the transportation of cover and liner-rock material.

According to a major supplier of container handling cranes, electric versions of container handling cranes are not available for the application needed for the Proposed Project. Consequently, electrification of the container handling cranes is not considered a feasible mitigation measure for this analysis.

In addition to the foregoing, it is also conceivable that waste could be transported from the intermodal rail yards to the landfill face using an electric conveyor, rather than hostling vehicles. This would not be practical, however. For efficient and sanitary landfill operation, waste must be deposited near the working face so that bags, etc. are not broken open and scattered during transportation. Since the working face will advance as much as 250 feet per day, it would be necessary to continually reposition the electric conveyors. The resulting downtime (as well as reliability problems) would have a severely deleterious effect on the efficiency of operation.

The same concept could be applied to the cover and liner-rock material. It is conceivable that a conveyor could transport cover and liner-rock material to the working face and liner construction area. However, this concept is not feasible due to the size of the aggregate for the cover and liner-rock material.

4.6.2.3 Energy Recovery Facilities

As discussed above, if landfill gas generation rates reach levels where an energy recovery facility becomes feasible, the Proposed Project may replace or supplement the flare system with a gas turbine power plant, gas treatment compression facility, or gas treatment liquefication facility.

For a gas turbine power plant, the landfill gas collected by the system of extraction wells would be piped to a gas turbine for combustion. Fueled by the landfill gas, the gas turbine would turn a generator to produce power for onsite use, with surplus power supplied to the local utility grid. The combustion of landfill gas in the gas turbine would result in the emissions of criteria pollutants such as NOx, CO, and PM_{10}. As required by the South Coast AQMD NSR program, the gas turbine would be equipped with BACT, which would include an SCR unit (or the equivalent) to control NOx emissions and an oxidation catalyst to control CO and ROG emissions. Tables 4-5 and 4-6 summarize the emission factors and emissions for a typical gas turbine; detailed emissions calculations are included in Attachment A.

If a gas compression facility were selected, the landfill gas captured by the landfill gas collection system would be piped to the facility for cleaning and compression.

The treated compressed landfill gas could be used onsite for alternative fuel fired equipment, with surplus gas being piped to the local gas utility distribution system.

For this type of facility, the landfill gas would be compressed and washed with solvents to remove any impurities such as CO_2 and sulfur. To remove the impurities from the solvent, the solvent would be aerated and the resulting air stream sent to an incinerator or flare for incineration. Combustion of the waste gas stream from the solvent cleaning operation would result in the emissions of criteria pollutants. In addition, hydrocarbon emissions would also result from valve and flange leaks from the landfill and processed gas handling system as well as the venting of tanks used to store condensate formed during the gas compression process. As with the gas turbine power plant, the gas compression facility would undergo South Coast AQMD NSR review and be equipped with BACT, which would include a NOx control system, such as an SCR or urea injection system on the waste gas incinerator/flare, as well as an oxidation catalyst for the control of CO and ROG. The valve and flange emissions would be controlled with a preventative maintenance program, and storage tank emissions would be controlled with a carbon control system. Tables 4-5 and 4-6 summarize the emission factors and emissions for a typical gas compression system; detailed emission calculations are included in Attachment A.

Table 4-5
Eagle Mountain Landfill and Recycling Center
Emission Factors Associated with Energy Recovery Systems

System	Emission Factors (lbs/MMBtu of fuel burned)				
	NOx	CO	PM10	ROG	SO2
Flare System[1]	0.038	0.027	0.024	0.011	0.0140
Gas Turbine Power Plant[2]	0.018	0.005	0.006	0.006	0.0140
Gas Compression System[3]	0.070	0.002	0.012	0.002	0.0006
Gas Liquefication System[3]	0.070	0.002	0.012	0.002	0.0006

Footnotes (Table 4-5):

1 Reflects use of urea injection (or equivalent) for NOx control and oxidation catalyst for CO and ROG control.

2 Reflects use of SCR (or equivalent) for NOx control and oxidation catalyst for CO and ROG control.

3 Emission factors for natural gas-fired combustor used to control waste gas stream from gas cleaning process. Reflects use of urea injections (or equivalent) for NOx control and oxidation catalyst for CO and ROG control.

Table 4-6 Eagle Mountain Landfill and Recycling Center Emissions Associated with Energy Recovery Systems					
System	Daily Emissions (lbs/day)				
	NOx	CO	PM10	ROG	SO2
Flare System[1]	1,265	903	803	368	468
Gas Turbine Power Plant[2]	585	171	199	196	468
Gas Compression System[3]	84	3	14	7	429
Gas Liquefication System[3]	84	3	14	9	429

Footnotes (Table 4-6):

1 Based on processing of 66 MMscf/day of landfill gas with a high heating value of 505 Btu/scf. Reflects use of urea injection (or equivalent) for NOx control and oxidation catalyst for CO and ROG control.

2 Based on processing 66 MMscf/day of landfill gas with a high heating value of 505 Btu/scf. Reflects use of SCR (or equivalent) for NOx control and oxidation catalyst for CO and ROG control.

3 Emissions include operation of a 50 MMBtu/hr combustor equipped with urea injection (or equivalent) for NOx control and oxidation catalyst for CO and ROG control. Emissions also include landfill gas sulfur removal (66 MMscf/day sulfur reduction from 40 to 1.5 ppmv), condensate storage tank, value and flange leaks.

For a gas liquefication system, the treated gas would be created using the same process as described above for the gas compression system. To liquefy the treated gas, additional compression/expansion steps would be required using compressors, coolers, and expansion vessels. The liquefied gas would be stored in onsite cryogenic tanks for use in onsite alternative fuel fired equipment with surplus liquefied gas being shipped offsite using tanker trucks or tanker rail cars. The emissions and environmental control system would be similar to the gas compression system. There would be additional valve and flange emissions due to the extra plumbing associated with the compression/cooling process. Tables 4-5 and 4-6 summarize the emission factors and emissions for a typical gas liquefication system with detailed emissions calculations included in Attachment A.

4.6.2.4 Air Quality Monitoring Program

To help monitor the air quality in the project impact area, Mine Reclamation Corporation should install and operate a fine particulate and a gaseous pollutant ambient monitoring system at the Project Site.

4.6.3 Mitigation Measures Recommended for Project Approval

Based on the discussion in the preceding sections, the following mitigation measures are recommended for project approval. Measures which are outside the jurisdiction of the lead agencies are suggested to address significant cumulative air quality impacts.

Mitigation Measure AQ-1: Truck Emission Standards. Trucks used to haul solid waste to the transfer stations and trucks used to haul solid waste to the landfill shall comply with all applicable federal and California motor vehicle pollution control regulations. All new trucks used to haul solid waste to the landfill, and purchased after the effective date of new, more stringent federal and California motor vehicle pollution control regulations, shall comply with those regulations.

Monitoring/Reporting Agencies: U.S. Environmental Protection Agency
California Air Resources Board
California Department of Motor Vehicles
California Highway Patrol

Mitigation Measure AQ-2: Diesel Fuel Quality. Trucks used to haul solid waste to the transfer stations and trucks used to haul solid waste directly to the landfill shall use Diesel fuel which complies with all applicable California Air Resources Board regulations for on-highway Diesel motor vehicle fuel.

Monitoring/Reporting Agencies: California Air Resources Board

Mitigation Measure AQ-3: South Coast Air Quality Management District Smoke Enforcement Program. Trucks used to haul solid waste to the transfer stations and trucks used to haul solid waste to the landfill shall be subjected to random checks for excessive smoke by the California Highway Patrol.

Monitoring/Reporting Agencies: California Highway Patrol
South Coast AQMD

Mitigation Measure AQ-4: California Highway Patrol Diesel Truck Inspection Program. Trucks used to haul solid waste to the transfer stations and trucks used to haul solid waste to the landfill shall be subjected to periodic checks for excessive smoke and emissions control system tampering at California Highway Patrol weight and safety inspection stations.

Monitoring/Reporting Agencies: California Highway Patrol
California Air Resources Board

Mitigation Measure AQ-5: Locomotive Operating Procedures. Mine Reclamation Corporation shall ensure that Diesel locomotives on the Eagle Mountain railway are shut down when the engines will not be needed for one hour or more. Mine

Reclamation Corporation shall ensure that Diesel locomotives on the Eagle Mountain railway receive regular preventive maintenance, in accordance with the engine manufacturers' recommendations. This maintenance will include daily visual checks for excessive smoke by the engineers and smoke measurements of each engine with an end-of-stack opacity meter at each scheduled maintenance interval, and at each unscheduled maintenance event. Locomotives which are observed to have excessive opacity, in excess of 20%, shall be removed from service and adjusted and/or repaired within three working days of the observation. A record of all visual and instrument checks for excessive smoke, as well as associated repairs, shall be maintained by Mine Reclamation Corporation, along with the routine maintenance logs for each engine.

Implemented by: Mine Reclamation Corporation
Monitoring/Reporting Agencies: Riverside County Planning Department

Mitigation Measure AQ-6: Diesel Fuel for Locomotive Operations. All Diesel locomotives on the Eagle Mountain railway shall be fueled with Diesel fuel which meets the requirements of the California Air Resources Board for on-highway motor vehicle Diesel fuel. Mine Reclamation Corporation shall maintain a record of all Diesel fuel purchases, including a statement by the supplier that the fuel complies with this requirement.

Implemented by: Mine Reclamation Corporation
Monitoring/Reporting Agencies: Riverside County

Mitigation Measure AQ-7: Diesel Locomotive Emission Standards. All new Diesel locomotive engines purchased by Mine Reclamation Corporation or Southern Pacific shall comply with all applicable state and federal emission control requirements. This includes any future regulations, such as a SCAB locomotive fleet average, which is described in the present California SIP.

Monitoring/Reporting Agencies: U.S. Environmental Protection Agency
California Air Resources Board

Mitigation Measure AQ-8: Diesel Locomotive Low-Emission Retrofits. All existing engines (whether SP engines or existing Kaiser locomotive engines) will be remanufactured to comply with future EPA regulations on such engines.

Monitoring/Reporting Agencies: U.S. Environmental Protection Agency
California Air Resources Board

Mitigation Measure AQ-9: Alternative Fuels for Diesel Locomotives. When three trains per day are delivering material to the landfill on a regular basis, Mine Reclamation Corporation shall prepare, or have prepared, a study of the technical feasibility and cost/effectiveness of using alternative fuels (such as natural gas) in the

locomotives used to deliver material to the landfill, as a means of reducing locomotive emissions.

Mitigation Measure AQ-10: Electrification of the Eagle Mountain Railway. When landfill gas generation is sufficient to warrant the construction of an energy recovery facility at the project site, Mine Reclamation Corporation shall prepare, or have prepared, a study of the cost/effectiveness of electrifying the Eagle Mountain railway to reduce emissions from locomotive emissions.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County

Mitigation Measure AQ-11: Landfill Equipment Operating Procedures. Mine Reclamation Corporation should ensure that equipment operators at the landfill shut down their engines if the equipment will be idle for fifteen minutes or longer. Mine Reclamation Corporation should schedule the number of machines and operators to match the anticipated waste volumes, and should match the number of hostling vehicles to the container handling capacity to avoid excessive queuing.

Mine Reclamation Corporation should ensure that Diesel-fueled equipment at the landfill receives regular preventive maintenance, in accordance with the engine manufacturers' recommendations. This maintenance should include daily visual checks for excessive smoke by the operations or maintenance staff. Equipment that is observed to have excessive opacity, in excess of 20%, shall be removed from service at the end of the next work shift, and adjusted and/or repaired within three working days of the observation. A record of all visual and instrument checks for excessive smoke, as well as related repairs, shall be maintained by Mine Reclamation Corporation along with the routine maintenance logs for each item of equipment.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure AQ-12: Diesel Fuel for Landfill Equipment. All Diesel-fueled equipment at the landfill shall be fueled with Diesel fuel which meets the requirements of the California Air Resources Board for on-highway motor vehicle Diesel fuel. Mine Reclamation Corporation shall maintain a record of all Diesel fuel purchases, including a statement by the supplier that the fuel complies with this requirement.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure AQ-13: On-Highway Engines for Landfill Equipment. Prior to purchasing any Diesel-fueled equipment for operation at the landfill, Mine

Reclamation Corporation shall evaluate the feasibility of purchasing the equipment with engines that are certified by the EPA and California Air Resources Board for use in on-highway trucks. If such engines are available, Mine Reclamation Corporation shall purchase the equipment with equivalent on-highway engines, unless (1) there is no suitable engine available; or (2) the mounting and installation requirements, or duty cycle limitations, make it infeasible to use available on-highway engines in that equipment.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure AQ-14: Low-NOx Engine Design for Landfill Equipment. For any Diesel-fueled landfill equipment for which there are no suitable on-highway equivalent engines, Mine Reclamation Corporation shall purchase the equipment with engines that are equipped with turbochargers and intercoolers (or aftercoolers). In addition, Mine Reclamation Corporation shall maintain these engines with the fuel injection timing retarded to a level recommended by the engine manufacturer for reduced NOx emissions, but which will not result in excessive visible smoke emissions.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure AQ-15: Construction Equipment Emission Standards. Mine Reclamation Corporation shall ensure that all landfill equipment which it purchases complies with all applicable federal and state emission control standards.

Implemented by:	California Air Resources Board U.S. Environmental Protection Agency

Mitigation Measure AQ-16: Electrification of Landfill Equipment. Wherever available and feasible, Mine Reclamation Corporation shall purchase and operate electric versions of landfill equipment, including the following, in lieu of Diesel (or other) fueled versions at the landfill site:

- crushers used for cover and liner material preparation.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure AQ-17: Control of Flare Emissions. When the landfill gas generation rate exceeds five million cubic feet per day, Mine Reclamation Corporation shall conduct an analysis of the technical and economic feasibility of

recovering energy from the flared landfill gas. If the analysis indicates that energy recovery is feasible, Mine Reclamation Corporation shall take the steps necessary to design, permit, and construct the energy recovery facilities before the landfill gas generation rate exceeds 10 million cubic feet per day.

If the analysis indicates that energy recovery is not feasible and the landfill gas generation rate exceeds eight million cubic feet, Mine Reclamation Corporation shall take the steps necessary to retrofit the flares with an oxidation catalyst system capable of achieving at least a 90% reduction in carbon monoxide emissions and a 50% reduction in non-methane hydrocarbon emissions. The oxidation catalyst system shall be installed and operating before the landfill gas generation rate exceeds 10 million cubic feet per day.

In the event that an oxidation catalyst system is not commercially available at that time, Mine Reclamation Corporation shall submit revised applications to the air pollution control agencies reflecting the higher carbon monoxide and non-methane hydrocarbon emission rates from the flares.

If an energy recovery facility is not constructed and the landfill gas generation rate exceeds 45 million cubic feet per day, Mine Reclamation Corporation shall take the steps necessary to retrofit a urea injection system (or equivalent system) capable of achieving at least a 30% reduction in oxides of nitrogen emissions. The urea injection system shall be installed and operating before the landfill gas generation rate exceeds 50 million cubic feet per day.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department
	South Coast AQMD
	U.S. Environmental Protection Agency

Mitigation Measure AQ-18: Temporary Road Surfaces. Mine Reclamation Corporation shall apply water and chemical dust suppressants as a dust suppressant to all temporary unpaved roads and staging areas which are used during normal operations for a period of less than 30 days and maintain nominal surface moisture contents sufficient to minimize fugitive dust.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	South Coast AQMD
	Riverside County Planning Department

Mitigation Measure AQ-19: Transitional Road Surfaces, Permanent Unpaved Haul Roads, Intermodal Yards, Truck Marshaling Yards. For all transitional unpaved road surfaces, which are used during normal operations for a period of more than thirty days but which are periodically reconstructed or relocated, Mine Reclamation Corporation shall apply chemical dust suppressants on a base of

compacted crushed rock to minimize fugitive dust emissions. The chemical dust suppressant shall be selected based on a field evaluation of candidate suppressants.

For the permanent unpaved haul road, intermodal yards, and truck marshaling yards, Mine Reclamation Corporation shall apply chemical dust suppressants on a base of compacted crushed rock to minimize fugitive dust emissions. The chemical dust suppressant shall be selected based on a field evaluation of candidate suppressants.

Implemented by: Mine Reclamation Corporation
Monitoring/Reporting Agencies: South Coast AQMD
Riverside County Planning Department

Mitigation Measure AQ-20: Permanent Road Surfaces. With the exception of the unpaved haul road, intermodal and truck marshaling yards, Mine Reclamation Corporation shall pave all onsite roads which will be fixed in their locations for five years or longer. These roads shall be periodically cleaned with vacuum sweepers and/or water flushed to minimize the buildup of loose surface material.

Implemented by: Mine Reclamation Corporation
Monitoring/Reporting Agencies: South Coast AQMD
Riverside County Planning Department

Mitigation Measure AQ-21: Tailing and Overburden Excavation. Mine Reclamation Corporation shall pre-water tailing and overburden piles prior to excavation.

Implemented by: Mine Reclamation Corporation
Monitoring/Reporting Agencies: South Coast AIR AQMD
Riverside County Planning Department

Mitigation Measure AQ-22: Miscellaneous Fugitive Dust Sources. Mine Reclamation Corporation shall apply water as a dust suppressant prior to clearing material from pit benches, prior to excavating leachate/condensate and landfill gas pipe ditches, during reconstruction of transitional roads, and during any other operations which could result in visible fugitive dust emissions which can be seen from locations outside the project boundary.

Implemented by: Mine Reclamation Corporation
Monitoring/Reporting Agencies: South Coast AQMD
Riverside County Planning Department

Mitigation Measure AQ-23: Wind Erosion. To minimize wind erosion, Mine Reclamation Corporation shall compact and apply a chemical dust suppressant to, or cover with a fabric cover, any inactive area disturbed by excavation or road construction activities during normal landfill operations sufficient to eliminate visible dust emissions.

Implemented by: Mine Reclamation Corporation
Monitoring/Reporting Agencies: South Coast AQMD
Riverside County Planning Department

Mitigation Measure AQ-24: Offsite Paved Roads. All haul trucks shall pass through an onsite wheel-washing station prior to leaving the site to minimize loose material tracked onto offsite paved roads. In addition, all trucks using offsite paved roads shall have covered loads or maintain a 2-foot freeboard height to minimize material spillage onto the roadway surface.

Implemented by: Mine Reclamation Corporation
Monitoring/Reporting Agencies: South Coast AQMD
Riverside County Planning Department

Mitigation Measure AQ-25: Material Processing Plants. Mine Reclamation Corporation shall equip the material processing plants with water sprays and/or enclosed transfer points vented to dust collectors to minimize fugitive particulate emissions.

Implemented by: Mine Reclamation Corporation
Monitoring/Reporting Agencies: South Coast AQMD
Riverside County Planning Department

Mitigation Measure AQ-26: Air Quality Monitoring System. Mine Reclamation Corporation shall install and operate a fine particulate and gaseous pollutant ambient monitoring system at a location chosen in consultation with the National Park Service and the South Coast AQMD. In addition, Mine Reclamation Corporation shall retain a qualified air quality specialist approved by the Riverside County Planning Department and the National Park Service to supervise all aspects of the air quality monitoring and reporting program.

Implemented by: Mine Reclamation Corporation
Monitoring/Reporting Agencies: South Coast AQMD
Riverside County Planning Department
National Park Service

4.6.4 Measures Not Currently Feasible

Listed below are measures not considered to be feasible at the present time, for the reasons discussed in the preceding sections.

- Use of catalytic trap oxidizers on new or existing Diesel locomotives
- Use of selective catalytic reductions systems on new or existing Diesel locomotives
- Use of alternative fuels such as methanol, LPG, or compressed natural gas in Diesel locomotives

- Use of catalytic trap oxidizers on new Diesel fueled landfill equipment
- Use of alternative fuels such as methanol, LPG, or compressed natural gas in new Diesel-fueled landfill equipment
- Use of electric versions of container handling cranes
- Use of electric conveyors to transport liner and cover material

However, should any of these technologies be required by applicable federal, state or local regulations, Mine Reclamation Corporation should take steps to comply with these regulations as expeditiously as possible. In the previous Environmental Impact Report for the Eagle Mountain Landfill and Recycling Center, the use of electric container handling cranes and liner/cover material conveyor belts were included as mitigation measures. Since the development of that document, it has been learned through discussions with equipment suppliers that electric container handling cranes are not currently available for the type and size needed for the Proposed Project. Consequently, this mitigation measure is no longer considered feasible. In addition, after further study of the necessary requirements for electric conveyors to transport liner/cover material, it has been determined that due to the physical size of this material, electric conveyors would not be a feasible mitigation measure.

4.7 Project Impacts (With Mitigation)

4.7.1 Total Project Emissions

The general discussion of emissions sources for the Proposed Project with mitigation is identical to the sources described for the Proposed Project without mitigation in Section 4-4. Table 4-7 summarizes the emissions for the Proposed Project with mitigation with detailed emission calculations included in Attachment A.

4.7.2 Effects of Mitigation

Table 4-8 shows the effect of the recommended mitigation measures for the Proposed Project.

The data show that the recommended mitigation measures have the greatest benefits for reducing emissions of oxides of nitrogen and sulfur dioxide. The oxides of nitrogen reductions are due to the use of low-NOx-emitting engines in locomotives and on-site landfill equipment. The locomotive emissions are assumed to comply with the year 2010 SCAB fleet average contained in the 1994 California SIP. The NOx reductions associated with the use of an urea injection system on the flare at maximum flare gas production levels are not shown as a credit in these tables, since they have been incorporated into the project design and are reflected in all estimates of project emissions. This is because it is anticipated that this level of control may be required by regulation at a future date.

Table 4-7
Eagle Mountain Landfill and Recycling Center
Total Project Emissions
Proposed Project With Mitigation

Activity	(lbs/day) NOx	CO	PM10	VOC	SO2	(tons/yr) NOx	CO	PM10	VOC	SO2
Offsite Sources										
Trains	3,377	1,170	206	342	157	616	214	38	62	29
On-Highway Trucks	940	451	127	94	26	172	82	23	17	5
Subtotal, Offsite	4,317	1,621	333	436	183	788	296	61	79	34
Onsite Sources										
Trains	104	50	5	14	4	19	9	1	2	1
On-Highway Trucks	3	3	0	0	0	1	0	0	0	0
Townsite	98	1,022	8	83	8	18	187	2	15	1
Onsite Vehicle Exhaust	1,237	764	106	156	95	226	139	19	29	17
Onsite Fugitive Dust			560					102		
Landfill Gas Flares	1,264	903	803	368	468	231	165	147	67	85
Fugitive Landfill Gas				311					57	
Maintenance Shop			0	12				0	2	
Emergency Generators	4	29	0	0	0	0	1	0	0	0
Fuel Storage Tanks				2					0	
Leachate/Condensate Tanks				0					0	
Locomotive Sand Silo			0					0		
Subtotal, Onsite	2,710	2,771	1,483	948	575	494	501	271	173	105
PROJECT TOTAL	7,027	4,392	1,816	1,384	758	1,282	797	332	252	139

Table 4-8
Eagle Mountain Landfill and Recycling Center
Proposed Project
Effect of Mitigation on Emissions
(tons/yr)

Activity	NOx	CO	PM_{10}	VOC	SOx
Without Mitigation					
Trains[1]	2186	321	49	103	166
Transfer Trucks[1]	181	83	24	18	5
Townsite	18	187	2	15	1
Onsite Vehicle Exhaust	551	95	32	29	17
Onsite Fugitive Dust			102		
Landfill Gas Flare Emissions	231	165	147	67	85
Fugitive Landfill Gas				57	
Emergency Generators	0	1	0	0	0
Maintenance Paint Shop			0	2	
Locomotive Sand Silo			0		
Leachate/CondensateTanks				0	
Fuel Storage and Dispensing				2	
Total Emissions	3167	852	355	292	276
With Mitigation					
Trains[1]	635	223	39	64	30
Transfer Trucks[1]	173	82	23	17	5
Townsite	18	187	2	15	1
Onsite Vehicle Exhaust	226	139	19	29	17
Onsite Fugitive Dust			102		
Landfill Gas Flares	231	165	147	67	85
Fugitive Landfill Gas				57	
Emergency Generators	0	1	0	2	0
Maintenance Paint Shop			0	2	
Locomotive Sand Silo			0		
Leachate/Condensate Tanks				0	
Fuel Storage and Dispensing				0	
Total Emissions	1282	797	332	252	139
Reduction Due to Mitigation					
Emissions (tons)	1885	55	23	40	137
Percent Reduction	60%	6%	6%	14%	50%

Footnote: [1] Train and truck emissions include both onsite and offsite emissions.

The sulfur dioxide reductions are due to the use of ultra-low-sulfur fuel in the locomotives operated by Southern Pacific. The Mine Reclamation Company will be responsible for any cost differential between the cost of normal locomotive fuel and the CARB Diesel fuel. The project design reflects the use of low-sulfur fuel for the onsite mobile equipment, since this fuel is required by CARB regulations. The use of this fuel results in associated reductions in particulate matter emissions as well.

In addition, the project design reflects substantial reductions (as discussed in Attachment A, up to 95%) in particulate emissions due to a variety of dust suppression techniques, since it is likely that these measures would be required in order to comply with South Coast AQMD and federal regulatory requirements. Consequently, all estimates of project emissions (with and without mitigation) reflect these reductions.

Reductions in carbon monoxide and volatile organic compounds (hydrocarbons) are expected beyond those already included in the project design to ensure that flare gas emissions of those pollutants do not exceed applicable regulatory trigger levels (i.e., use of oxidation catalyst). These reductions are mainly due to the use of engines with low CO and VOC emissions in locomotives and onsite mobile equipment.

4.7.3 Ambient Impacts Near Landfill Site

Table 4-9 shows a re-analysis of the Proposed Project's air quality impacts which reflect the mitigation measures. The data indicate that the Proposed Project with mitigation is not expected to result in a violation of the state or national standards for NO_2, SO_2 or CO, even in combination with background ambient levels measured at the Project Site. For PM_{10}, Project impacts alone are not expected to exceed the state or national standards. However, the state and national 24-hour average PM_{10} standards are exceeded in the absence of the Project. The Project's impacts exacerbate violations of the PM_{10} standard.

As discussed previously, this air quality impact analysis reflects a high degree of conservatism, including:

1. Landfill gas generation rates are the maximum forecast, 66.25 million cubic feet per day. This forecast was based on gas generation rates in the South Coast Air Basin. As discussed elsewhere in this report, gas generation rates at the Landfill Site are expected to be much lower. Furthermore, this maximum landfill gas generation rate is not expected to be reached for at least 30 years after the project begins operation, if it is reached at all.

2. The combustion emissions for the flare system assumes that 100% of the landfill gas generated will be piped to the flares for incineration while it is likely that a small fraction of this gas (i.e., 5 to 10 percent) may actually escape the system as fugitive emissions.

Table 4-9
Eagle Mountain Landfill and Recycling Center
Proposed Project With Mitigation
Ambient Air Quality Impacts

Pollutant/ Averaging Time	California Standards	National Standards	EPA Class II Increments ($\mu g/m^3$)	Modeled Ambient Impact ($\mu g/m^3$)	Ambient Background Levels[1] ($\mu g/m^3$)	Combined Levels ($\mu g/m^3$)
NO_2						
1-hour	470	-	-	266	75	441
Annual	-	100	-	14	6	24
SO_2						
1-hour	655	-	-	35	213	248
3-hour	-	1300	512	34	-	-
24-hour	105	365	91	11	34	45
Annual	-	80	20	1	11	12
CO						
1-hour	23,000	40,000	-	1,761	10,354	12,115
8-hour	10,000	10,000	-	655	4,304	4,959
PM_{10}						
24-hour	50	150	30	35[2]	210	245
Annual	30	50	17	5	22	27

Footnote:

1 For NO_2, CO, and PM_{10}, maximum levels monitored at the Project Site. Because ambient SO_2 levels were not measured at the Project Site, background SO_2 levels are the maximum monitored within the SEDAB.

2 The maximum allowable Class II PM_{10} increment may be exceeded during one 24-hour period at any one location. For the mitigated project, the Class II increment was not exceeded more than once at any location.

3. Only currently available emission control technologies have been assumed, although recent history has shown that dramatic improvements will likely be made between the start of the project and the date worst case impacts could occur.

The results of this analysis are presented for one-hour averaging periods only, since these impacts would occur for only short periods of time during the day. The data indicate that there would be only a minor impact for carbon monoxide during train crossings. The nitrogen dioxide impact reflects the short-term concentration which could be reached near the intersection, assuming worst-case weather conditions. As with previous analyses, these levels are likely to overestimate actual concentrations.

4.7.4 Impacts at a Typical Rail Crossing

Using the same data presented elsewhere in the report regarding traffic impacts, a modeling analysis was performed to evaluate the worst case potential air quality impacts at a rail crossing for the Proposed Project with mitigation. The results are presented in Table 4-10.

Table 4-10
Eagle Mountain Landfill and Recycling Center
Proposed Project With Mitigation
Air Quality Impacts at Rail Crossings

Pollutant/ Averaging Time	Strictest California Standard (ug/m^3)	Strictest National Standard (ug/m^3)	Maximum Impact (ug/m^3)	Percent of Standard (%)
CO (1-hour)	23,000	40,000	332	1.4
NO_2 (1-hour)	470	—	37	7.9

4.7.5 Impacts on Joshua Tree National Park

The impacts of the Proposed Project with mitigation on the Joshua Tree National Park are discussed in detail in Part 6. The proposed project, including the gas flares, would not create a noticeable change or impact in regional visibility or haze to the casual observer from locations at the closest boundaries of JTNP to the Project Site. This is based upon the results of the visibility modeling which indicate no readings above the threshold of ΔE of 4.0 or a contrast value of 0.10 for the mitigated project. The proposed project at full operation with mitigation would create a slight discoloration in regional visibility for the most sensitive observer less than 0.5% of the time within four miles of the Project Site. This impact is considered insignificant because: 1) the sensitive observer would need to be in an area of the Park where there are no existing trails or campsites; 2) the observer would have to be at this location for some part of the 39 hours per year (0.45%) that this condition might occur; and 3) the maximum contrast in visibility during these 39 hours would be less than 10%. Also, acid deposition impacts, as well as impacts on vegetation, are not significant. Finally, the Proposed Project with mitigation will not exceed the EPA Class I area increments.

4.7.6 Cumulative Impacts at the Project Site

A detailed analysis of the cumulative impacts at the Project Site for the Proposed Project with mitigation is included as Part 8.

4.8 Assessment of Significance

4.8.1 Significance Comparison Tables

Ozone. Table 4-11 compares the impacts of the Proposed Project with various significance criteria for ozone. In this table, VOC and NOx emissions are used to evaluate the significance of ozone impacts; there are no approved techniques available which can be used to estimate the change in ambient ozone concentrations due to any of the alternatives.

As shown in Table 4-11, many of the emission and concentration based significance thresholds are exceeded by the Proposed Project with and without mitigation. As such, the Proposed Project would be expected to have a significant impact on ozone, due to increases in hydrocarbon and NOx emissions.

Nitrogen Dioxide. Table 4-12 compares the impacts of the Proposed Project with various significance criteria for nitrogen dioxide. As shown in Table 4-12, compared to a baseline of zero emissions/concentrations, the Proposed Project is shown to exceed many of the emission/concentration based significance thresholds. As such, the Proposed Project would be expected to have a significant impact on nitrogen dioxide.

Carbon Monoxide. The impact of the Proposed Project on carbon monoxide is shown in Table 4-13. The data show that, compared with a baseline of zero emissions/concentrations, the Proposed Project would exceed many of the emission/concentration based significance thresholds and would be expected to have a significant impact on carbon monoxide.

Sulfur Dioxide. Table 4-14 shows the impacts of the Proposed Action on sulfur dioxide. The data show that, compared with a baseline of zero emissions/ concentrations, the Proposed Project would exceed many of the emission/concentration based significance thresholds and would be expected to have a significant impact on sulfur dioxide.

Particulate Sulfates - Since particulate sulfates are formed in the atmosphere from emissions of sulfur dioxide, conclusions regarding the significance of sulfur dioxide impacts would be applicable to sulfates as well.

Fine Particulates. The impacts of the Proposed Project on fine particulates are shown in Table 4-15. Once again, the data show that the Proposed Project

Table 4-11
Assessment of Significance for Hydrocarbons/Oxides of Nitrogen/Ozone
Eagle Mountain Landfill and Recycling Center
Proposed Project

Measure of Significance	Level	HC Without Mitigation	HC With Mitigation	NOx Without Mitigation	NOx With Mitigation
Hydrocarbon/Oxides of Nitrogen Emissions-Based Measures - Industrial Sources					
AQMD Major Source	25 tons/year	292	252	3167	1282
AQMD Major Modification	25 tons/year	292	252	3167	1282
AQMD BACT	0 lbs/day	1599	1384	17355	7027
AQMD Offsets	4 tons/year	292	252	3167	1282
AQMD CEQA	55 lbs/day	1599	1384	17355	7027
AQMD Major PSD	25 tons/year	292	252	3167	1282
AQMD Significant Increase PSD	25 tons/year	292	252	3167	1282
EPA Major Source	100 tons/year	292	252	3167	1282
EPA Major Modification	40 tons/year (VOC, NOx)	292	252	3167	1282
EPA Major Modification	50 tons/year (NMOC)	57	57	N/A	N/A
Ozone Concentration-Based Measures - Industrial Sources					
None	N/A	N/A	N/A	N/A	N/A
Ozone Measurement Accuracy and Reporting Precision					
ARB Accuracy	0.54 pphm	N/A	N/A	N/A	N/A
ARB Reporting	1 pphm	N/A	N/A	N/A	N/A

Table 4-12
Assessment of Significance for Oxides of Nitrogen
Eagle Mountain Landfill and Recycling Center
Proposed Project

Measure of Significance	Level	Without Mitigation	With Mitigation
Emissions-Based Measures - Industrial Sources			
AQMD Major Source	25 tons/year	3167	1282
AQMD Major Modification	25 tons/year	3167	1282
AQMD BACT	0 lbs/day	17355	7027
AQMD Offsets	4 tons/year	3167	1282
AQMD CEQA	55 lbs/day	17355	7027
AQMD Major PSD	25 tons/year	3167	1282
AQMD Significant Increase PSD	25 tons/year	3167	1282
AQMD RECLAIM	4 tons/year	3167	1282
EPA Major Source	100 tons/year	3167	1282
EPA Major Modification	40 tons/year	3167	1282
Concentration-Based Measures - Industrial Sources			
AQMD Offset Modeling 1-hr	20 $\mu g/m^3$	323	266
AQMD/EPA Class I Annual	2.5 $\mu g/m^3$	2*	1*
AQMD/EPA Class II Annual	25 $\mu g/m^3$	22	14
EPA de Minimis Annual	14 $\mu g/m^3$	22	14
EPA Significant Annual	1 $\mu g/m^3$	22	14
Nitrogen Dioxide Measurement Accuracy and Reporting Precision			
ARB Accuracy 1-Hr	0.18 pphm	17	14
ARB Report 1-Hr	1.0 pphm	17	14
ARB Report Annual	0.1 pphm	1	<1

*Maximum level for Class I area (Joshua Tree National Park)

Table 4-13
Assessment of Significance for Carbon Monoxide
Eagle Mountain Landfill and Recycling Center
Proposed Project

Measure of Significance	Level	Without Mitigation	With Mitigation
Emissions-Based Measures - Industrial Sources			
AQMD Major Source	100 tons/year	852	797
AQMD Major Modification	100 tons/year	852	797
AQMD BACT	0 lbs/day	4697	4392
AQMD Offsets	29 tons/year	852	797
AQMD CEQA	550 lbs/day	4697	4392
AQMD Major PSD	25 tons/year	852	797
AQMD Significant Increase PSD	25 tons/year	852	797
EPA Major Source	250 tons/year	852	797
EPA Major Modification	100 tons/year	852	797
Concentration-Based Measures - Industrial Sources			
AQMD Offset Modeling	1100 $\mu g/m^3$ 1-Hr 500 $\mu g/m^3$ 8-Hr	1761 655	1761 655
EPA de Minimis 8-Hr	575 $\mu g/m^3$	655	655
EPA Significant 8-Hr	500 $\mu g/m^3$	655	655
EPA Significant 1-Hr	2,000 $\mu g/m^3$	1761	1761
Measurement Accuracy and Reporting Precision			
ARB Accuracy 1-Hr	0.02 ppm	2	2
ARB Report 1-Hr	1 ppm	2	2
ARB Report 8-Hr	0.1 ppm	1	1

Table 4-14
Assessment of Significance for Sulfur Dioxide
Eagle Mountain Landfill and Recycling Center
Proposed Project

Measure of Significance	Level	Without Mitigation	With Mitigation
Emissions-Based Measures - Industrial Sources			
AQMD Major Source	100 tons/year	276	139
AQMD Major Modification	40 tons/year	276	139
AQMD BACT	0 lbs/day	1510	758
AQMD Offsets	4 tons/year	276	139
AQMD CEQA	150 lbs/day	1510	758
AQMD Major PSD	25 tons/year	276	139
AQMD Significant Increase PSD	25 tons/year	276	139
AQMD RECLAIM	4 tons/year	276	139
EPA Major Source	100 tons/year	276	139
EPA Major Modification	40 tons/year	276	139
Concentration-Based Measures - Industrial Sources			
AQMD Offset Modeling 24-hr	1 $\mu g/m^3$	12	11
AQMD/EPA Class I Annual	2 $\mu g/m^3$	<3*	<1*
AQMD/EPA Class I 24-Hr	5 $\mu g/m^3$	<3*	<3*
AQMD/EPA Class I 3-Hr	25 $\mu g/m^3$	9*	11
AQMD Class II Annual	20 $\mu g/m^3$	2	1
AQMD Class II 24-Hr	37 $\mu g/m^3$	12	11
AQMD Class II 3-Hr	512 $\mu g/m^3$	36	34
EPA de Minimis 24-Hr	13 $\mu g/m^3$	12	11
EPA Significant Annual	1 $\mu g/m^3$	2	1
EPA Significant 24-Hr	5 $\mu g/m^3$	12	11
EPA Significant 3-Hr	25 $\mu g/m^3$	36	34
Measurement Accuracy and Reporting Precision			
ARB Accuracy 1-Hr	0.33 pphm 1-Hr	1	1
ARB Reporting 1-Hr	1 pphm 1-Hr	1	1

*Maximum level for Class I area (Joshua Tree National Park)

Table 4-15
Assessment of Significance for Fine Particulate (PM_{10})
Eagle Mountain Landfill and Recycling Center
Proposed Project

Measure of Significance	Level	Without Mitigation	With Mitigation
Directly Emitted PM_{10} Emissions-Based Measures - Industrial Sources			
AQMD Major Source	70 tons/year	355	332
AQMD Major Modification	15 tons/year	355	332
AQMD BACT	0 lbs/day	1945	1816
AQMD Offsets	4 tons/year	355	332
AQMD CEQA	150 lbs/day	1945	1816
AQMD Major PSD	25 tons/year	355	332
AQMD Significant Increase PSD	15 tons/year	355	332
EPA Major Source	100 tons/year	355	332
EPA Major Modification	15 tons/year	355	332
Concentration-Based Measures - Industrial Sources			
AQMD Offset Modeling	1 $\mu g/m^3$	6	5
AQMD Class I Annual	5 $\mu g/m^3$	<1*	<1*
AQMD Class I 24-Hr	10 $\mu g/m^3$	7*	7*
AQMD Class II AGM	19 $\mu g/m^3$	6	5
AQMD Class II 24-Hr	19 $\mu g/m^3$	38	35
EPA Class I Annual	1 $\mu g/m^3$	1*	1*
EPA Class I 24-Hr	8 $\mu g/m^3$	7*	7*
EPA Class II Annual	17 $\mu g/m^3$	6	5
EPA Class II 24-Hr	30 $\mu g/m^3$	38	35
EPA de Minimis 24-Hr	19 $\mu g/m^3$	38	35
EPA Significant Annual	1 $\mu g/m^3$	6	5
EPA Significant 24-Hr	5 $\mu g/m^3$	38	34
Measurement Accuracy and Reporting Precision			
ARB Accuracy 24-Hr	1.2 $\mu g/m^3$	38	35
ARB Reporting 24-Hr	1 $\mu g/m^3$	38	35
ARB Reporting Annual	0.1 $\mu g/m^3$	6	5

*Maximum level for Class I area (Joshua Tree National Park)

results in significant impacts for this pollutant when compared to a zero baseline due to exceedances of many of the emission/concentration based significance thresholds.

4.8.2 Regional Visibility

The proposed project, including the gas flares, would not create a noticeable change or impact in regional visibility or haze to the casual observer from locations at the closest boundaries of JTNP to the Project Site. This is based upon the results of the visibility modeling which indicate no readings above the threshold of ΔE of 4.0 or a contrast of 0.10 for the mitigated project. The proposed project at full operation with mitigation would create a slight discoloration in regional visibility for the most sensitive observer less than 0.5% of the time within four miles of the Project Site. This impact is considered insignificant because: 1) the sensitive observer would need to be in an area of the Park where there are no existing trails or campsites; 2) the observer would have to be at this location for some part of the 39 hours per year (0.45%) that this condition might occur; and 3) the maximum contrast in visibility during these 39 hours would be less than 10%.

4.8.3 Acid Deposition

Acid deposition in California results from pollutants formed from oxides of nitrogen and sulfur oxides emissions. A detailed analysis of the acid deposition impacts of the Proposed Project is included in Part 6, the Joshua Tree National Park analysis. Based on this analysis, the Proposed Project would not have a significant impact on acid deposition.

4.8.4 Toxic Air Pollutants

The screening-level risk assessment included as Attachment C indicates that the risk from toxic air contaminants associated with the Proposed Project is greater than the a one in a million level which is typically assumed to represent a significant toxic impact. Although the analyses presented in this report assume that landfill gas generation rates would be the same for both in-basin and desert sites, the drier climate and lower moisture content in the waste would be expected to result in lower generation rates for the Proposed Project. The lower gas generation rates would result in less flaring and fugitive landfill gas emissions, which in turn would mean lower emissions of toxic air contaminants.

4.8.5 Global Warming

"Greenhouse" gases which could contribute to the global warming effect are generated by the operation of landfill equipment; the flaring of landfill gases; and the transportation of waste material. The Proposed Project would result in the generation of gases which could contribute to global warming. However, the state of knowledge regarding global warming is not adequate to allow an assessment of the significance of the impacts of any individual project at the present time.

4.8.6 Overall Assessment of Significance

Based on the analyses contained in the preceding sections, the Proposed Project would be expected to have a significant effect on air quality. However, as discussed in Part 7, the Proposed Project could result in lower emission levels in the South Coast Air Basin for all pollutants, at the expense of increased impacts in desert areas. The improvements in the South Coast Air Basin would pass through to the desert areas over the San Gorgonio Pass; however, these benefits would not be sufficient to outweigh the direct adverse impacts in the desert.

Part 5
ALTERNATIVES

5.1 Reduced Volume Alternative

5.1.1 Introduction

Emissions for the Reduced Volume Alternative will be associated with the same activities as the Proposed Project, although to a lesser extent. As with the Proposed Project, activities for the Reduced Volume Alternative will occur both offsite, such as rail and truck hauling of waste to the project, and on-site, including all of the operations of the landfill equipment. They will involve both stationary sources, such as the landfill gas flares, and mobile equipment, such as the hostling vehicles used for hauling waste. For the Reduced Volume Alternative at maximum operating levels, 16,000 tons per day of waste will be transported to the landfill, with 14,000 tons/day hauled by rail and 2,000 tons/day hauled by truck. Because the amount of waste hauled by truck is identical to the level assumed for the Proposed Project, the emissions for truck waste hauling will be identical between the Proposed Project and the Reduced Volume Alternative. Rail hauling for this project alternative is approximately 78% of the level assumed for the Proposed Project (i.e., 14,000 versus 18,000 tons/day). Consequently, for this alternative, rail emissions will be approximately 22% lower than for the Proposed Project. The following sections discuss these conclusions in more detail.

Although Material Recovery Facilities (MRFs) and Transfer Stations (TSs) are not part of the Proposed Project, they are discussed in Attachment A (Section A-1), to provide context for the general waste management process. Emissions generated at the MRFs/TSs are also included in Attachment A.

5.1.2 Emissions - Initial Construction

The emissions associated with construction of the Reduced Volume Alternative will be the same as those described in Part 4 for the Proposed Project.

5.1.3 Emissions - Operation

5.1.3.1 Solid Waste Transport

Under the Reduced Volume Alternative, solid waste will be transported to landfill by the same two modes as the Proposed Project (i.e., trains and trucks). The configurations of trains and trucks will be the same under the Reduced Volume Alternative as described above for the Proposed Project. The train deliveries will be reduced from 18,000 tons/day to 14,000 tons/day, but the truck deliveries would

remain unchanged at 2,000 tons/day. Locomotive fuel consumption is directly proportional to the trash hauled. Thus, all locomotive fuel use in this alternative would be only 14/18 = 78% of the fuel used for the Proposed Project. Similarly, because rail emissions scale directly as fuel use, the rail emissions in the Reduced Volume Alternative will be 78% of those in the Proposed Project. The truck emissions will be unchanged from those for the Proposed Project, as shown in Part 4. The emissions and fuel use for a single train trip in the Reduced Volume Alternative will be the same as those shown for the Proposed Project. However, for a rail haulage of 14,000 tons/day, only 4 trains per day (instead of 5-6 trains per day) will be required. The resulting daily and annual emissions are shown in 5-1, with detailed emissions calculations included in Attachment A.

5.1.3.2 On-Site Material Handling (except Fugitive Dust)

The onsite mobile emission sources such as crawler tractors, compactors, hostling vehicles, and haul trucks will be the same for the Proposed Project but to a lesser degree. For many of the onsite equipment, compared to the Proposed Project, emissions will decrease proportionally to the decrease in the amount of waste transported to the landfill. Table 5-1 summarizes the emissions for onsite mobile equipment for the Reduced Volume Alternative, with detailed emissions calculations included in Attachment A.

5.1.3.3 Landfill Gas Generation and Combustion

Because the amount of landfill gas generated depends on the amount of waste in place at the landfill, estimates of landfill gas generation and associated emissions levels for the Reduced Volume Alternative are a fraction (i.e., 80%) of the levels for the Proposed Project based on the lower waste delivery rate for this project alternative. This is because gas is generated in the landfill over a period of approximately 30 years. If the amount of waste deposited per day is reduced, then there is a proportionate reduction in the tonnage of waste deposited over a 30 year period and, hence, a reduction in the volume of waste available to generate landfill gas. The flare emission factors and gas collection system capture efficiency are the same for the Reduced Volume Alternative and the Proposed Project. In addition, as with the Proposed Project, to account for both the maximum emissions from the flares and maximum fugitive landfill gas emissions, it is assumed that the flares incinerate 100% of the landfill gas generated while 10% of the landfill gas generated is assumed to escape the landfill as fugitive emissions. These assumptions are discussed in more detail in Part 4 with detailed emission calculations included in Attachment A.

5.1.3.4 Fugitive Dust

Fugitive dust emissions for the Reduced Volume Alternative involve the same types of activities as discussed in Part 4 for the Proposed Project, but will occur to a lesser

degree. A summary of the fugitive dust emissions for the Reduced Volume Alternative is shown in Table 5-1, with detailed emissions calculations included in Attachment A.

5.1.3.5 Miscellaneous Sources

Estimates of emissions for miscellaneous emission sources such as emergency generators, fuel storage and dispensing, and a maintenance paint shop are the same

for the Reduced Volume Alternative as for the Proposed Project. These estimates are discussed in Part 4.

5.1.3.6 Townsite

The estimate of emissions for the development of the Eagle Mountain Townsite for the Reduced Volume Alternative will be the same as discussed in Part 4 for the Proposed Project. A summary of these emissions is shown in Table 5-1

5.1.4 Project Impacts (Without Mitigation)

5.1.4.1 Total Project Emissions

Total emissions for all sources under the Reduced Volume Alternative without mitigation at maximum projected operating levels are shown in Table 5-1. These emission levels include controls that the project must incorporate in order to comply with South Coast Air Quality Management District and U.S. Environmental Protection Agency emission standards.

5.1.4.2 Ambient Impacts Near Landfill Site

Using the same methodology as for the Proposed Project, an analysis was performed of the impacts of the Reduced Volume Alternative on ambient concentrations of pollutants. This analysis was performed for the area surrounding the project site.

As discussed in Part 4, all of the analyses described below were performed with a high degree of conservatism, with the result that the concentrations shown are much higher than the levels which would likely be experienced. Table 5-2 presents the results of the air quality modeling analysis.

Table 5-1
Total Project Emissions Without Mitigation
Reduced Volume Alternative

Activity	(lbs/day) NOx	CO	PM10	VOC	SO2	(tons/yr) NOx	CO	PM10	VOC	SO2
Offsite Sources										
Trains	9,148	1,302	206	410	692	1,669	238	38	75	126
On-Highway Trucks	940	451	127	94	26	172	82	23	17	5
Subtotal, Offsite	10,088	1,753	333	504	718	1,841	320	61	92	131
Onsite Sources										
Trains	171	70	5	30	19	31	13	1	5	3
On-Highway Trucks	48	7	3	6	1	9	1	1	1	0
Townsite	98	1,022	8	83	8	18	187	2	15	1
Onsite Vehicle Exhaust	2,473	427	142	128	77	451	78	26	23	14
Onsite Fugitive Dust			458					84		
Landfill Gas Flares	1,012	723	642	294	375	185	132	117	54	68
Fugitive Landfill Gas				249					45	
Maintenance Shop			1	12				0	2	
Emergency Generators	4	29	0	0	0	0	1	0	0	0
Fuel Storage Tanks				2					0	
Leachate/Condensate Tanks				0					0	
Locomotive Sand Silo			0					0		
Subtotal, Onsite	3,805	2,278	1,259	805	479	694	411	230	147	87
PROJECT TOTAL	13,893	4,031	1,592	1,309	1,197	2,535	731	291	[illegible]	219

The data indicate that the Reduced Volume Alternative's unmitigated impacts would represent the following fractions of the most stringent ambient air quality standards for each pollutant:

Carbon Monoxide	7%
Nitrogen Dioxide	56%
Sulfur Dioxide	10%
Fine Particulates (PM_{10})	62%

These levels are predictions of the worst-case project impacts at any location outside of the project boundary. These concentrations are projected, in the absence of mitigation measures, at a location to the north, northwest and west of the community of Eagle Mountain.

Table 5-2
Eagle Mountain Landfill and Recycling Center
Reduced Volume Alternative Without Mitigation
Ambient Air Quality Impacts

Pollutant/ Averaging Time	California Standards	National Standards	EPA Class II Increments ($\mu g/m^3$)	Modeled Ambient Impact[1] ($\mu g/m^3$)	Ambient Background Levels[2] ($\mu g/m^3$)	Combined Levels ($\mu g/m^3$)
NO_2						
1-hour	470	-	-	258	75	333
Annual	-	100	25	18	6	24
SO_2						
1-hour	655	-	-	31	213	244
3-hour	-	1300	512	29	-	-
24-hour	105	365	91	10	34	44
Annual	-	80	20	2	11	13
CO						
1-hour	23,000	40,000	-	1,559	10,354	11,913
8-hour	10,000	10,000	-	579	4,304	4,883
PM_{10}						
24-hour	50	150	30	31[3]	210	241
Annual	30	50	17	5	22	27

Footnote:

1 Calculated based on ambient impacts shown in Part 4 for Proposed Project without mitigation and relative onsite emissions between Proposed Project without mitigation and Reduced Volume Alternative without mitigation.

2 For NO_2, CO, and PM_{10}, maximum levels monitored at the Project Site. Because ambient SO_2 levels were not measured at the Project Site, background SO_2 levels are the maximum monitored within the SEDAB.

3 The maximum allowable Class II PM_{10} increment may be exceeded during one 24-hour period at any one location. For the mitigated project, the Class II increment was not exceeded more than once at any location.

5.1.4.3 Impacts at a Typical Rail Crossing

Impacts at typical rail crossings under the Reduced Volume Alternative would be identical to those discussed in Part 4 for the Proposed Project. However, the number of trains per day would be approximately 22% lower, thus reducing the frequency with which these impacts would occur.

5.1.4.4 Impacts on Joshua Tree National Park

A separate analysis of the ambient impacts on the Joshua Tree National Park was also performed; a detailed discussion of the analysis is included in Part 6.

5.1.4.5 Cumulative Impacts at the Project Site

A detailed analysis of the cumulative impacts at the Project Site for the Reduced Volume Alternative without mitigation is included in Part 8.

5.1.5 Consistency with Regulatory Programs

5.1.5.1 Consistency with Federal Requirements

Prevention of Significant Deterioration. The determination as to whether the Reduced Volume Alternative will be subject to Prevention of Significant Deterioration (PSD) review is based on its emissions. As in the case of the Proposed Project, the "source" which could be subject to review includes the landfill gas flares, material processing plants, maintenance paint shop, and emergency generators. Except for a minor reduction in the emissions associated with the on-site material processing plants, the summary of emissions shown in Part 4 for the Proposed Project would be applicable to the Reduced Volume Alternative as well. The emission control options proposed for the flares for the Proposed Project would also be applicable to the Reduced Volume Alternative, and would result in that Alternative's emissions being reduced to levels which would not require PSD review.

New Source Performance Standards for Non-Metallic Mineral Processing Plants (40CFR, Part 60, Subpart 000) - As in the case of the Proposed Project, the material processing plants under the Reduced Volume Alternative would be subject to, and are expected to comply with, this applicable federal New Source Performance Standard.

New Source Performance Standard for Municipal Solid Waste Landfills (40CFR, Part 60, Subpart WWW). As in the case of the Proposed Project, the Reduced Volume Alternative will be subject to, and is expected to comply with, this federal New Source Performance Standard.

National Emissions Standards for Hazardous Air Pollutants (40CFR, Part 61). There are no National Emissions Standards applicable to this project alternative.

Title V Operating Permits Program (40CFR, Part 70). This program establishes a comprehensive operating permit program for Major stationary sources. Since the only purpose of the Title V regulation is to combine all applicable requirements from other air quality regulatory programs into a single permit, there are no additional emission limits or control technology requirements imposed by the program. This project alternative will be subject to the Title V permit program.

5.1.5.2 Consistency with Local Requirements

Prohibitory Rules. The South Coast Air Quality Management District limits the emissions of various pollutants from many sources in the District, including landfill flares and other gas combustion devices. These rules will apply to this project alternative, and the project alternative has been designed to comply with them. A detailed discussion of these rules is included in Part 4. The applicable rules are listed below.

- Rule 53 (Specific Air Contaminants)
- Rule 201 (Permits to Construct)
- Rule 202 (Permits to Operate)
- Rule 401 (Visible Emissions)
- Rule 402 (Nuisance)
- Rule 403 (Fugitive Dust)
- Rule 404 (Particulate Matter - Concentration)
- Rule 405 (Solid Particulate Matter - Weight)
- Rule 407 (Liquid and Gaseous Air Contaminants)
- Rule 409 (Combustion Contaminants)
- Rule 431.1 (Sulfur Content of Gaseous Fuels)
- Rule 461 (Gasoline Transfer and Dispensing)
- Rule 474 (Fuel-Burning Equipment - Oxides of Nitrogen)
- Rule 481 (Spray Coating Operations)
- Rule 1107 (Coating of Metal Parts and Products)
- Rule 1150 (Excavation of Landfill Sites)
- Rule 1150.1 (Control of Gaseous Emissions from Active Landfills)
- Rule 1171 (Solvent Cleaning Operations)

Regulation IX (New Source Performance Standards). The South Coast Air Quality Management District has adopted by reference the federal New Source Performance Standards. A discussion of the applicable federal New Source Performance Standards is included in Part 4.

Regulation X (National Emission Standards for Hazardous Air Pollutants). The South Coast Air Quality Management District has adopted by reference the federal

National Emissions Standards for Hazardous Air Pollutants. A discussion of the applicable federal New Source Performance Standards is included in Part 4.

Regulation XIII (New Source Review). The South Coast Air Quality Management District New Source Review rules (contained in Regulation II and Regulation XIII of the SCAQMD Rules and Regulations) govern the preconstruction review of new and modified stationary sources that emit nonattainment pollutants. The discussion of this rule in Part 4 with respect to the Proposed Project would apply to the Reduced Volume Alternative as well.

Regulation XIV (Toxics). Rule 1401 will require that a health risk assessment be performed for permit units required to undergo new source review according to Regulation XIII. The discussion of this rule in Part 4 with respect to the Proposed Project would apply to the Reduced Volume Alternative as well.

Regulation XVII (Prevention of Significant Deterioration). The discussion of this rule in Part 4 with respect to the Proposed Project would apply to the Reduced Volume Alternative as well.

Regulation XX (RECLAIM). The discussion of this rule in Part 4 with respect to the Proposed Project would apply to the Reduced Volume Alternative as well.

Regulation XXX (Title V Permits). The discussion of this rule in Part 4 with respect to the Proposed Project would apply to the Reduced Volume Alternative as well.

5.1.6 Mitigation

The mitigation measures recommended for the Proposed Project are also recommended for the Reduced Volume Alternative. These measures, which are discussed in more detail in Part 4, are listed below.

- Mitigation Measure AQ-1: Truck Emission Standards
- Mitigation Measure AQ-2: Diesel Fuel Quality
- Mitigation Measure AQ-3: South Coast Air Quality Management District Smoke Enforcement Program
- Mitigation Measure AQ-4: California Highway Patrol Diesel Truck Inspection Program
- Mitigation Measure AQ-5: Locomotive Operating Procedures
- Mitigation Measure AQ-6: Diesel Fuel for Locomotive Operations
- Mitigation Measure AQ-7: Diesel Locomotive Emission Standards
- Mitigation Measure AQ-8: Diesel Locomotive Low Emission Retrofits
- Mitigation Measure AQ-9: Alternative Fuels for Diesel Locomotives
- Mitigation Measure AQ-10: Electrification of the Eagle Mountain Railway
- Mitigation Measure AQ-11: Landfill Equipment Operating Procedures

- Mitigation Measure AQ-12: Diesel Fuel for Landfill Equipment
- Mitigation Measure AQ-13: On-Highway Engines for Landfill Equipment
- Mitigation Measure AQ-14: Low NOx Engine Design for Landfill Equipment
- Mitigation Measure AQ-15: Construction Equipment Emission Standards
- Mitigation Measure AQ-16: Electrification of Landfill Equipment
- Mitigation Measure AQ-17: Control of Flare Emissions
- Mitigation Measure AQ-18: Temporary Road Surfaces
- Mitigation Measure AQ-19: Transitional Road Surfaces
- Mitigation Measure AQ-20: Permanent Road Surfaces
- Mitigation Measure AQ-21: Tailing and Overburden Excavation
- Mitigation Measure AQ-22: Miscellaneous Fugitive Dust Sources
- Mitigation Measure AQ-23: Wind Erosion
- Mitigation Measure AQ-24: Offsite Paved Roads
- Mitigation Measure AQ-25: Material Processing Plants
- Mitigation Measure AQ-26: Air Quality Monitoring System

5.1.7 Project Impacts (With Mitigation)

5.1.7.1 Total Project Emissions

Table 5-3 summarizes the total project emissions for the Reduced Volume Alternative with mitigation.

5.1.7.2 Effects of Mitigation

Table 5-4 shows the effect of the recommended mitigation measures on total project emissions.

The data show that the recommended mitigation measures have the greatest benefits for reducing emissions of oxides of nitrogen and sulfur dioxide. The oxides of nitrogen reductions are due to the use of low-NOx-emitting engines in locomotives and on-site landfill equipment. The NOx reductions associated with the use of a urea injection system on the flare at maximum flare gas production levels are not shown as a credit in these tables, since they have been incorporated into the project design and are reflected in all estimates of project emissions. This is because it is anticipated that this level of control may be required by regulation at a future date.

The sulfur dioxide reductions are due to the use of ultra-low sulfur fuel in locomotives. The project design reflects the sulfur dioxide reductions associated with the use of low-sulfur fuel for onsite mobile equipment, since the use of this fuel is required by CARB regulations. The use of this fuel results in associated reductions in particulate matter emissions as well.

Table 5-3
Eagle Mountain Landfill and Recycling Center
Total Project Emissions
Reduced Volume Alternative With Mitigation

Activity	(lbs/day) NOx	CO	PM10	VOC	SO2	(tons/yr) NOx	CO	PM10	VOC	SO2
Offsite Sources										
Trains	2,627	910	160	266	122	479	166	29	49	22
On-Highway Trucks	940	451	127	94	26	172	82	23	17	5
Subtotal, Offsite	3,567	1,361	287	360	148	651	248	52	66	27
Onsite Sources										
Trains	81	39	4	11	3	15	7	1	2	1
On-Highway Trucks	3	3	0	0	0	1	0	0	0	0
Townsite	98	1,022	8	83	8	18	187	2	15	1
Onsite Vehicle Exhaust	946	540	84	115	69	173	98	15	21	13
Onsite Fugitive Dust			458					84		
Landfill Gas Flares	1,012	723	642	294	375	185	132	117	54	68
Fugitive Landfill Gas				249					45	
Maintenance Shop			0	12				0	2	
Emergency Generators	4	29	0	0	0	0	1	0	0	0
Fuel Storage Tanks				2					0	
Leachate/Condensate Tanks				0					0	
Locomotive Sand Silo			0					0		
Subtotal, Onsite	2,143	2,355	1,197	767	455	391	425	218	140	83
PROJECT TOTAL	5,710	3,716	1,484	1,127	603	1,042	673	270	206	110

Table 5-4
Eagle Mountain Landfill and Recycling Center
Reduced Volume Alternative
Effect of Mitigation on Emissions
(tons/yr)

Activity	NOx	CO	PM_{10}	VOC	SOx
Without Mitigation					
Trains	1700	251	30	80	129
Transfer Trucks	181	83	24	18	5
Onsite Vehicle Exhaust	451	78	26	23	14
Townsite	18	187	2	15	1
Onsite Fugitive Dust			84		
Landfill Gas Flare Emissions	185	132	117	54	68
Fugitive Landfill Gas				45	
Emergency Generators	0	1	0	0	0
Maintenance Paint Shop			0	2	
Locomotive Sand Silo			0		
Leachate/Condensate Tanks				0	
Fuel Storage and Dispensing				0	
Total Emissions	2536	731	292	239	219
With Mitigation					
Trains	494	173	30	51	23
Transfer Trucks	173	82	23	17	5
Onsite Vehicle Exhaust	173	99	15	21	13
Townsite	18	187	2	15	1
Onsite Fugitive Dust			84		
Landfill Gas Flares	185	132	117	54	68
Fugitive Landfill Gas				45	
Emergency Generators	0	1	0	0	0
Maintenance Paint Shop			0	2	
Locomotive Sand Silo			0		
Leachate/Condensate Tanks				0	
Fuel Storage and Dispensing				0	
Total Emissions	1043	673	271	206	110
Reduction Due to Mitigation					
Emissions (tons)	1493	58	21	33	109
Percent Reduction	59%	8%	7%	14%	50%

In addition, the project design reflects substantial reductions (see detailed calculations in Attachment A, up to 95%) in particulate emissions due to a variety of dust suppression techniques, since it is likely that these measures would be required in order to comply with South Coast Air Quality Management District and federal regulatory requirements. Consequently, all estimates of project emissions (with and without mitigation) reflect these reductions.

Reductions in carbon monoxide and volatile organic compounds (hydrocarbons) are also expected beyond those already included in the project design to ensure that flare gas emissions of that pollutant do not exceed applicable regulatory trigger levels (i.e., use of oxidation catalyst). These reductions are due to the use of engines with low CO and VOC emissions in locomotives.

5.1.7.3 Ambient Impacts Near Landfill Site

Table 5-5 shows a re-analysis of the project's air quality impacts, reflecting the mitigation measures. The data indicate that the Reduced Volume Alternative's mitigated impacts would represent the following fractions of the most stringent ambient air quality standards for each pollutant:

Carbon Monoxide	7%
Nitrogen Dioxide	45%
Sulfur Dioxide	9%
Fine Particulates (PM_{10})	56%

These levels are predictions of the worst-case project impacts at any location outside of the project boundary. These concentrations are projected, in the absence of mitigation measures, at a location to the north, northwest and west of the community of Eagle Mountain

5.1.7.4 Impacts at a Typical Rail Crossing

Impacts at typical rail crossings under the Reduced Volume Alternative with mitigation would be the same as the results shown for the Proposed Project with mitigation in Part 4.

5.1.7.5 Impacts on Joshua Tree National Park

A separate analysis of the ambient impacts on the Joshua Tree National Park was performed; a detailed discussion of the analysis is included in Part 6.

Table 5-5
Eagle Mountain Landfill and Recycling Center
Reduced Volume Alternative With Mitigation
Ambient Air Quality Impacts

Pollutant/ Averaging Time	California Standards	National Standards	EPA Class II Increments ($\mu g/m^3$)	Modeled Ambient Impact[1] ($\mu g/m^3$)	Ambient Background Levels[2] ($\mu g/m^3$)	Combined Levels ($\mu g/m^3$)
NO_2			-			
1-hour	470	-	25	210	75	285
Annual	-	100		11	6	17
SO_2			-			
1-hour	655	-	512	28	213	241
3-hour	-	1300	91	27	-	-
24-hour	105	365	20	9	34	43
Annual	-	80		1	11	12
CO			-			
1-hour	23,000	40,000	-	1,497	10,354	11,851
8-hour	10,000	10,000		557	4,304	4,861
PM_{10}						
24-hour	50	150	30	28	210	238
Annual	30	50	17	5	22	27

Footnote:
[1] Calulated based on ambient impacts shown in Part 4 for Proposed Project with mitigation and relative onsite emissions between Proposed Project with mitigation and Reduced Volume Alternative with mitigation.
[2] For NO_2, CO, and PM_{10}, maximum levels monitored at the Project Site. Because ambient SO_2 levels were not measured at the Project Site, background SO_2 levels are the maximum monitored within the SEDAB.

5.1.7.6 Cumulative Impacts at the Project Site

A detailed analysis of the cumulative impacts at the Project Site for the Reduced Volume Alternative with mitigation is included in Part 8.

5.1.8 Assessment of Significance

5.1.8.1 Significance Comparison Tables

Ozone. Table 5-6 compares the impacts of the Reduced Volume Alternative with various significance criteria for ozone. In this table, hydrocarbon and NOx emissions are used to evaluate the significance of ozone impacts; there are no approved techniques available which can be used to estimate the change in ambient ozone concentrations due to any of the alternatives. As shown in Table 5-6, many of the emission and concentration based significance thresholds are exceeded by the Reduced Volume Alternative with and without mitigation. As such, the Reduced Volume Alternative would be expected to have a significant impact on ozone, due to increases in hydrocarbon and NOx emissions

Nitrogen Dioxide. Table 5-7 compares the impacts of the Reduced Volume Alternative with various significance criteria for nitrogen dioxide. The data show that the Reduced Volume Alternative results in significant impacts for this pollutant when compared to a zero baseline due to exceedances of many of the emission/concentration based significance thresholds.

Carbon Monoxide. The impact of the Reduced Volume Alternative on carbon monoxide is shown in Table 5-8. Once again, the data show that this project alternative results in significant impacts for this pollutant when compared to a zero baseline due to exceedances of many of the emission/concentration based significance thresholds.

Sulfur Dioxide - Table 5-9 shows the impacts of the Reduced Volume Alternative on sulfur dioxide. Once again, the data show that this project alternative results in significant impacts for this pollutant when compared to a zero baseline due to exceedances of many of the emission/concentration based significance thresholds.

Particulate Sulfates - Since particulate sulfates are formed in the atmosphere from emissions of sulfur dioxide, conclusions regarding the significance of sulfur dioxide impacts would be applicable to sulfates as well.

Fine Particulates - The impacts on fine particulates of the Reduced Volume Alternative are shown in Table 5-10. Once again, the data show that this project alternative results in significant impacts for this pollutant when compared to a zero baseline due to exceedances of many of the emission/concentration based significance thresholds.

Table 5-6
Assessment of Significance for Hydrocarbons/Oxides of Nitrogen/Ozone
Eagle Mountain Landfill and Recycling Center
Reduced Volume Alternative

Measure of Significance	Level	HC Without Mitigation	HC With Mitigation	NOx Without Mitigation	NOx with Mitigation
Hydrocarbon/Oxides of Nitrogen Emissions-Based Measures - Industrial Sources					
AQMD Major Source	25 tons/year	239	206	2535	1042
AQMD Major Modification	25 tons/year	239	206	2535	1042
AQMD BACT	0 lbs/day	1309	1127	13893	5710
AQMD Offsets	4 tons/year	239	206	2535	1042
AQMD CEQA	55 lbs/day	1309	1127	13893	5710
AQMD Major PSD	25 tons/year	239	206	2535	1042
AQMD Significant Increase PSD	25 tons/year	239	206	2535	1042
EPA Major Source	100 tons/year	239	206	2535	1042
EPA Major Modification	40 tons/year (VOC, NOx)	239	206	2535	1042
EPA Major Modification	50 tons/year (NMOC)	45	45	N/A	N/A
Ozone Concentration-Based Measures - Industrial Sources					
None	N/A	N/A	N/A	N/A	N/A
Ozone Measurement Accuracy and Reporting Precision					
ARB Accuracy	0.54 pphm	N/A	N/A	N/A	N/A
ARB Reporting	1 pphm	N/A	N/A	N/A	N/A

Table 5-7
Assessment of Significance for Oxides of Nitrogen
Eagle Mountain Landfill and Recycling Center
Reduced Volume Alternative

Measure of Significance	Level	Without Mitigation	With Mitigation
Emissions-Based Measures - Industrial Sources			
AQMD Major Source	25 tons/year	2535	1042
AQMD Major Modification	25 tons/year	2535	1042
AQMD BACT	0 lbs/day	13893	5710
AQMD Offsets	4 tons/year	2535	1042
AQMD CEQA	55 lbs/day	13893	5710
AQMD Major PSD	25 tons/year	2535	1042
AQMD Significant Increase PSD	25 tons/year	2535	1042
AQMD RECLAIM	4 tons/year	2535	1042
EPA Major Source	100 tons/year	2535	1042
EPA Major Modification	40 tons/year	2535	1042
Concentration-Based Measures - Industrial Sources			
AQMD Offset Modeling 1-hr	20 $\mu g/m^3$	258	210
AQMD/EPA Class I Annual	2.5 $\mu g/m^3$	2*	1*
AQMD/EPA Class II Annual	25 $\mu g/m^3$	18	11
EPA de Minimis Annual	14 $\mu g/m^3$	18	11
EPA Significant Annual	1 $\mu g/m^3$	14	11
Nitrogen Dioxide Measurement Accuracy and Reporting Precision			
ARB Accuracy 1-Hr	0.18 pphm	14	11
ARB Report 1-Hr	1.0 pphm	14	11
ARB Report Annual	0.1 pphm	1	1
*Maximum for Class I area (Joshua Tree National Park)			

Table 5-8
Assessment of Significance for Carbon Monoxide
Eagle Mountain Landfill and Recycling Center
Reduced Volume Alternative

Measure of Significance	Level	Without Mitigation	With Mitigation
Emissions-Based Measures - Industrial Sources			
AQMD Major Source	100 tons/year	731	673
AQMD Major Modification	100 tons/year	731	673
AQMD BACT	0 lbs/day	4031	3716
AQMD Offsets	29 tons/year	731	673
AQMD CEQA	550 lbs/day	4031	3716
AQMD Major PSD	25 tons/year	731	673
AQMD Significant Increase PSD	25 tons/year	731	673
EPA Major Source	250 tons/year	731	673
EPA Major Modification	100 tons/year	731	673
Concentration-Based Measures - Industrial Sources			
AQMD Offset Modeling	1100 $\mu g/m^3$ 1-Hr 500 $\mu g/m^3$ 8-Hr	1,569 579	1,497 557
EPA de Minimis 8-Hr	575 $\mu g/m^3$	579	557
EPA Significant 8-Hr	500 $\mu g/m^3$	579	557
EPA Significant 1-Hr	2,000 $\mu g/m^3$	1,559	1,497
Measurement Accuracy and Reporting Precision			
ARB Accuracy 1-Hr	0.02 ppm	1	1
ARB Report 1-Hr	1 ppm	1	1
ARB Report 8-Hr	0.1 ppm	1	1

Table 5-9
Assessment of Significance for Sulfur Dioxide
Eagle Mountain Landfill and Recycling Center
Reduced Volume Alternative

Measure of Significance	Level	Without Mitigation	With Mitigation
Emissions-Based Measures - Industrial Sources			
AQMD Major Source	100 tons/year	239	110
AQMD Major Modification	40 tons/year	239	110
AQMD BACT	0 lbs/day	1198	603
AQMD Offsets	4 tons/year	239	110
AQMD CEQA	150 lbs/day	1198	603
AQMD Major PSD	25 tons/year	239	110
AQMD Significant Increase PSD	25 tons/year	239	110
AQMD RECLAIM	4 tons/year	239	110
EPA Major Source	100 tons/year	239	110
EPA Major Modification	40 tons/year	239	110
Concentration-Based Measures - Industrial Sources			
AQMD Offset Modeling 24-hr	1 $\mu g/m^3$	10	9
AQMD/EPA Class I Annual	2 $\mu g/m^3$	1*	<1*
AQMD/EPA Class I 24-Hr	5 $\mu g/m^3$	2*	2*
AQMD/EPA Class I 3-Hr	25 $\mu g/m^3$	7*	7*
AQMD Class II Annual	20 $\mu g/m^3$	2	1
AQMD Class II 24-Hr	13 $\mu g/m^3$	10	9
AQMD Class II 3-Hr	512 $\mu g/m^3$	29	27
EPA de Minimis 24-Hr	13 $\mu g/m^3$	10	9
EPA Significant Annual	1 $\mu g/m^3$	2	1
EPA Significant 24-Hr	5 $\mu g/m^3$	10	9
EPA Significant 3-Hr	25 $\mu g/m^3$	29	27
Measurement Accuracy and Reporting Precision			
ARB Accuracy 1-Hr	0.33 pphm 1-Hr	1	1
ARB Reporting 1-Hr	1 pphm 1-Hr	1	1

*Maximum for Class I area (Joshua Tree National Park)

Table 5-10
Assessment of Significance for Fine Particulate (PM_{10})
Eagle Mountain Landfill and Recycling Center
Reduced Volume Alternative

Measure of Significance	Level	Without Mitigation	With Mitigation
Directly Emitted PM_{10} Emissions-Based Measures - Industrial Sources			
AQMD Major Source	70 tons/year	291	270
AQMD Major Modification	15 tons/year	291	270
AQMD BACT	0 lbs/day	1592	1484
AQMD Offsets	4 tons/year	291	270
AQMD CEQA	150 lbs/day	1592	1484
AQMD Major PSD	25 tons/year	291	270
AQMD Significant Increase PSD	15 tons/year	291	270
EPA Major Source	100 tons/year	291	270
EPA Major Modification	15 tons/year	291	270
Concentration-Based Measures - Industrial Sources			
AQMD Offset Modeling	1 $\mu g/m^3$	-	-
AQMD Class I Annual	5 $\mu g/m^3$	<1*	1*
AQMD Class I 24-Hr	10 $\mu g/m^3$	5*	5*
AQMD Class II Annual	10 $\mu g/m^3$	5	5
AQMD Class II 24-Hr	37 $\mu g/m^3$	31	28
EPA Class I Annual	4 $\mu g/m^3$	<1*	<1*
EPA Class I 24-hr	8 $\mu g/m^3$	5*	5*
EPA Class II Annual	17 $\mu g/m^3$	-	5
EPA Class II 24-hr	30 $\mu g/m^3$	31	28
EPA de Minimis 24-Hr	10 $\mu g/m^3$	31	28
EPA Significant Annual	1 $\mu g/m^3$	-	5
EPA Significant 24-Hr	5 $\mu g/m^3$	31	28
Measurement Accuracy and Reporting Precision			
ARB Accuracy 24-Hr	1.2 $\mu g/m^3$	31	28
ARB Reporting 24-Hr	1 $\mu g/m^3$	31	28
ARB Reporting Annual	0.1 $\mu g/m^3$	55	5

*Maximum for Class I area (Joshua Tree National Park)

5.1.8.2 Regional Visibility

Regional visibility is affected by emissions of hydrocarbons, oxides of nitrogen, sulfur dioxide, and particulate matter. A detailed analysis of the Proposed Project's impacts on regional visibility is included in Part 6 for the Joshua Tree National Park impact analysis. Based on this analysis, the Proposed Project would not be expected to have a noticeable change in regional visibility. Because the onsite emissions for the Project Alternative are similar to the Proposed Project, this Alternative would be expected to have similar regional visibility impacts.

5.1.8.3 Acid Deposition

Acid deposition in California results from pollutants formed from oxides of nitrogen and sulfur oxides emissions. A detailed analysis of acid deposition for the Proposed Project is included in Part 6 for the Joshua Tree National Park impact analysis. Based on this analysis, the Proposed Project would not have a significant impact on acid deposition. Because the onsite emissions for this project Alternative are similar to the Proposed Project, this Alternative would also be expected to have similar, although lesser, impacts.

5.1.8.4 Toxic Air Pollutants

Each of the project alternatives is expected to have the same impact with respect to air toxics, which are associated with the combustion of flare gases. Although the analyses presented in this report assume that landfill gas generation rates would be the same for both in-basin and desert sites, the drier climate and lower moisture content in the waste would be expected to result in lower generation rates for the desert site alternatives. The lower gas generation rates would result in less flaring, which in turn would mean lower emissions of toxic air contaminants.

The screening level risk assessment shown in Attachment C indicates that the risk from toxic air contaminants associated with the Proposed Project is greater than a one in a million level which is typically assumed to represent a significant toxic impact.

5.1.8.5 Global Warming

"Greenhouse" gases which could contribute to the global warming effect are generated by the operation of landfill equipment, the flaring of landfill gases, and the transportation of waste material.

The Reduced Volume Alternative results in a 16% reduction of "greenhouse" gas emissions for the operation of landfill equipment, as compared with the Proposed Project. Overall, the Reduced Volume Alternative would result in the generation of gases which could contribute to global warming. However, the state of knowledge

regarding global warming is not adequate to allow an assessment of the significance of the impacts of any individual project at the present time.

5.1.8.6 Overall Assessment of Significance

Based on the analyses contained in the preceding sections, the Reduced Volume Alternative is expected to have a significant effect on air quality. However, as shown in Part 7, the Reduced Volume Alternative could result in lower emission levels in the South Coast Air Basin for all pollutants, at the expense of increased impacts in desert areas. The improvements in the South Coast Air Basin would pass through to the desert areas over the San Gorgonio Pass; however, these benefits would not be sufficient to outweigh the direct adverse impacts in the desert.

5.2 Rail Access Only Alternative

5.2.1 Introduction

Emissions for the Rail Access Only Alternative will be associated with the same activities as the Proposed Project, although to a lesser extent. As with the Proposed Project, for the Rail Access Only Alternative activities will occur both offsite, such as rail hauling of waste to the project, and on-site, including all of the operations of the landfill equipment. They will involve both stationary sources, such as the landfill gas flares, and mobile equipment, such as the hostling vehicles used for hauling waste. For the Rail Access Only Alternative, at maximum operating levels 18,000 tons per day of waste will be transported to the landfill by rail with no truck hauling included for this project alternative. Because the amount of waste hauled by rail is identical to the level assumed for the Proposed Project, the emissions for rail hauling will be identical between the Proposed Project and the Rail Access Only Alternative. The following sections discuss these conclusions in more detail.

5.2.2 Emissions - Initial Construction

The emissions associated with construction of the Rail Access Only Alternative will be the same as those described in Part 4 for the Proposed Project.

5.2.3 Emissions - Operation

5.2.3.1 Solid Waste Transport

Under the Rail Access Only Alternative, solid waste will be transported to the landfill by rail only. The configurations of the trains will be the same under the Rail Access Only Alternative as described above for the Proposed Project with rail emissions unchanged from those shown for the Proposed Project in Part 4.

5.2.3.2 On-Site Material Handling (except Fugitive Dust)

The onsite mobile emission sources, such as crawler tractors, compactors, hostling vehicles, and haul trucks, will be the same for the Proposed Project but to a lesser degree. For many of the onsite equipment, compared to the Proposed Project, emissions will decrease proportionally to the decrease in the amount of waste transported to the landfill. Table 5-11 summarizes the emissions for onsite mobile equipment for the Rail Access Only Alternative with detailed emission calculations included in Attachment A.

5.2.3.3 Landfill Gas Generation and Combustion

Because the amount of landfill gas generated depends on the amount of waste in place at the landfill, estimates of landfill gas generation and associated emissions levels for the Rail Access Only Alternative are a fraction (i.e., 90%) of the levels for the Proposed Project based on the lower waste delivery rate for this project alternative. The flare emission factors and gas collection system capture efficiency are the same for the Rail Access Only Alternative and the Proposed Project. In addition, as with the Proposed Project, to account for both the maximum emissions for the flares and maximum fugitive landfill gas emissions, it is assumed that the flares incinerate 100% of the landfill gas generated while 10% of the landfill gas generated is also assumed to escape the landfill as fugitive emissions. These assumptions are discussed in more detail in Part 4 with detailed emission calculations included in Attachment A.

5.2.3.4 Fugitive Dust

Fugitive dust emissions for the Rail Access Only Alternative involve the same types of activities as discussed in Part 4 for the Proposed Project, but will occur to a lesser degree. A summary of the fugitive dust emissions for the Rail Access Only Alternative is shown in Table 5-11 with detailed emission calculations included in Attachment A.

5.2.3.5 Miscellaneous Sources

Estimates of emissions for miscellaneous emission sources, such as emergency generators, fuel storage and dispensing, and a maintenance paint shop, are the same for the Rail Access Only Alternative as for the Proposed Project. These estimates are discussed in Part 4.

5.2.3.6 Townsite

The estimate of emissions for the development of the Eagle Mountain Townsite for the Rail Access Only Alternative will be the same as those discussed in Part 4 for the Proposed Project. A summary of these emissions is shown in Table 5-11.

Table 5-11
Total Project Emissions Without Mitigation
Rail Access Only Alternative

Activity	(lbs/day) NOx	CO	PM10	VOC	SO2	(tons/yr) NOx	CO	PM10	VOC	SO2
Offsite Sources										
Trains	11,761	1,673	264	527	889	2,146	305	48	96	16
Subtotal, Offsite	11,761	1,673	264	527	889	2,146	305	48	96	16
Onsite Sources										
Trains	220	90	7	39	24	40	16	1	7	
Townsite	98	1,022	8	83	8	18	187	2	15	
Onsite Vehicle Exhaust	2,781	480	159	144	87	507	88	29	26	1
Onsite Fugitive Dust			509					93		
Landfill Gas Flares	1,138	813	723	331	421	208	148	132	60	7
Fugitive Landfill Gas				280					51	
Maintenance Shop			1	12				0	2	
Emergency Generators	4	29	0	0	0	0	1	0	0	
Fuel Storage Tanks				2					0	
Leachate/Condensate Storage Tanks				0					0	
Locomotive Sand Silo			0					0		
Subtotal, Onsite	4,240	2,434	1,407	892	540	773	440	257	163	9
PROJECT TOTAL	16,001	4,107	1,671	1,419	1,429	2,920	745	305	259	26

5.2.4 Project Impacts (Without Mitigation)

5.2.4.1 Total Project Emissions

Total emissions for all sources under the Rail Access Only Alternative at maximum projected operating levels are shown in Table 5-11. These emission levels include controls that the project must incorporate in order to comply with South Coast Air Quality Management District and U.S. Environmental Protection Agency emission standards.

5.2.4.2 Ambient Impacts Near Landfill Site

Using the same methodology as for the Proposed Project, an analysis was performed of the impacts of the Rail Access Only Alternative on ambient concentrations of pollutants. This analysis was performed for the area surrounding the project site.

As discussed in Part 4, all of the analyses described below were performed with a high degree of conservatism, with the result that the concentrations shown are much higher than the levels which would likely be experienced. Table 5-12 presents the results of the air quality modeling analysis.

The data indicate that the Rail Access Only Alternative's unmitigated impacts would represent the following fractions of the most stringent ambient air quality standards for each pollutant:

Carbon Monoxide	7%
Nitrogen Dioxide	63%
Sulfur Dioxide	11%
Fine Particulates (PM_{10})	68%

These levels are predictions of the worst case project impacts at any location outside of the project boundary. These concentrations are projected, in the absence of mitigation measures, at a location to the north, northwest and west of the community of Eagle Mountain.

5.2.4.3 Impacts at a Typical Rail Crossing

Impacts at typical rail crossings under the Rail Access Only Alternative would be identical to those discussed in Part 4 for the Proposed Project.

5.2.4.4 Impacts on Joshua Tree National Park

A separate analysis of the ambient impacts on the Joshua Tree National Park was also performed, with a detailed discussion of the analysis included as in Part 6.

Table 5-12
Eagle Mountain Landfill and Recycling Center
Rail Access Only Alternative Without Mitigation
Ambient Air Quality Impacts

Pollutant/ Averaging Time	California Standards	National Standards	EPA Class II Increments ($\mu g/m^3$)	Modeled Ambient Impact ($\mu g/m^3$)	Ambient Background Levels[1] ($\mu g/m^3$)	Combined Levels ($\mu g/m^3$)
NOx						
1-hour	470	-	-	294	75	369
Annual	-	100	25	20	6	26
SO_2						
1-hour	655	-	-	34	213	247
3-hour	-	1300	512	33	-	-
24-hour	105	365	91	11	34	45
Annual	-	80	20	2	11	13
CO						
1-hour	23,000	40,000	-	1,666	10,354	12,020
8-hour	10,000	10,000	-	620	4,304	4,929
PM_{10}						
24-hour	50	150	30	34[3]	210	244
Annual	30	50	17	5	22	27

Footnote:

1 Calculated based on ambient impacts shown in Part 4 for Proposed Project without mitigation and relative onsite emissions between Proposed Project without mitigation and Rail Access Only Alternative without mitigation.

2 For NO_x, CO, and PM10, maximum levels monitored at the Project Site. Because ambient SOx levels were not measured at the Project Site, background SOx levels are the maximum monitored within the SEDAB.

3 The maximum allowable Class II PM_{10} increment may be exceeded during one 24-hour period at any one location. For the mitigated project, the Class II increment was not exceeded more than once at any location.

5.2.4.5 Cumulative Impacts at the Project Site

A detailed analysis of the cumulative impacts at the Project Site for the Rail Only Alternative without mitigation is included in Part 8.

5.2.5 Consistency with Regulatory Programs

5.2.5.1 Consistency with Federal Requirements

Prevention of Significant Deterioration. The determination as to whether the Rail Access Only Alternative will be subject to Prevention of Significant Deterioration

(PSD) review is based on its emissions. As in the case of the Proposed Project, the "source" which could be subject to review includes the landfill gas flares, material processing plants, maintenance paint shop, emergency generators. Except for a minor reduction in the emissions associated with the on-site material processing plants, the summary of emissions shown in Part 4 for the Proposed Project would also be applicable to the Rail Access Only Alternative. The additional mitigation proposed for the flares for the Proposed Project would also be applicable to the Rail Access Only Alternative, and would result in that Alternative's emissions being reduced to levels which would not require PSD review.

New Source Performance Standards for Non-Metallic Mineral Processing Plants (40CFR, Part 60, Subpart 000) - As in the case of the Proposed Project, the material processing plants under the Rail Access Only Alternative would be subject to, and is expected to comply with, this applicable federal New Source Performance Standard.

New Source Performance Standard for Municipal Solid Waste Landfills (40CFR, Part 60, Subpart WWW). As in the case of the Proposed Project, the Rail Access Only Alternative will be subject to, and is expected to comply with, this federal New Source Performance Standard.

National Emissions Standards for Hazardous Air Pollutants (40CFR, Part 61). There are no National Emissions Standards applicable to this project alternative.

Title V Operating Permits Program (40CFR, Part 70). This program establishes a comprehensive operating permit program for major stationary sources. Since the only purpose of the Title V regulation is to combine all applicable requirements from other air quality regulatory programs into a single permit, there are no additional emission limits or control technology requirements imposed by the program. This project alternative will be subject to the Title V permit program.

5.2.5.2 Consistency with Local Requirements

Prohibitory Rules. The South Coast Air Quality Management District limits the emissions of various pollutants from many sources in the District, including landfill flares and other gas combustion devices. These rules will apply to this project alternative, and the project alternative has been designed to comply with them. A detailed discussion of these rules is included in Part 4. The applicable rules are shown below.

- Rule 53 (Specific Air Contaminants)
- Rule 201 (Permits to Construct)
- Rule 202 (Permits to Operate)
- Rule 401 (Visible Emissions)
- Rule 402 (Nuisance)

- Rule 403 (Fugitive Dust)
- Rule 404 (Particulate Matter - Concentration)
- Rule 405 (Solid Particulate Matter - Weight)
- Rule 407 (Liquid and Gaseous Air Contaminants)
- Rule 409 (Combustion Contaminants)
- Rule 431.1 (Sulfur Content of Gaseous Fuels)
- Rule 461 (Gasoline Transfer and Dispensing)
- Rule 474 (Fuel-Burning Equipment - Oxides of Nitrogen)
- Rule 481 (Spray Coating Operations)
- Rule 1107 (Coating of Metal parts and Products)
- Rule 1150 (Excavation of Landfill Sites)
- Rule 1150.1 (Control of Gaseous Emissions from Active Landfills)
- Rule 1171 (Solvent Cleaning Operations)

Regulation IX (New Source Performance Standards). The South Coast Air Quality Management District has adopted by reference the federal New Source Performance Standards. The South Coast Air Quality Management District has not received delegation of Subpart Cc and Subpart WWW of the New Source Performance Standards. A discussion of the applicable federal New Source Performance Standards is included in Part 4.

Regulation X (National Emission Standards for Hazardous Air Pollutants). The South Coast Air Quality Management District has adopted by reference the federal National Emissions Standards for Hazardous Air Pollutants. A discussion of the applicable federal New Source Performance Standards is included in Part 4.

Regulation XIII (New Source Review). The South Coast Air Quality Management District New Source Review rules (contained in Regulation II and Regulation XIII of the SCAQMD Rules and Regulations) govern the preconstruction review of new and modified stationary sources that emit nonattainment pollutants. The discussion of this rule in Part 4 with respect to the Proposed Project would apply to the Rail Access Only Alternative as well.

Regulation XIV (Toxics). Rule 1401 will require that a health risk assessment be performed for permit units required to undergo new source review according to Regulation XIII. The discussion of this rule in Part 4 with respect to the Proposed Project would apply to the Rail Access Only Alternative as well.

Regulation XVII (Prevention of Significant Deterioration). The discussion of this rule in Part 4 with respect to the Proposed Project would apply to the Rail Access Only Alternative as well.

Regulation XX (RECLAIM). The discussion of this rule in Part 4 with respect to the Proposed Project would apply to the Rail Access Only Alternative as well.

Regulation XXX (Title V Permits). The discussion of this rule in Part 4 with respect to the Proposed Project would apply to the Rail Access Only Alternative as well.

5.2.6 Mitigation

The same mitigation measures discussed above for the Reduced Volume Alternative would be applicable to the Rail Access Only Alternative, with the exception of those measures directed towards on-highway trucks. The same mitigation measures recommended for the Proposed Project are recommended as well for the Rail Access Only Alternative, with the exception of on-highway truck mitigation measures. These measures are listed below and discussed in more detail in Part 4.

- Mitigation Measure AQ-5: Locomotive Operating Procedures
- Mitigation Measure AQ-6: Diesel Fuel for Locomotive Operations
- Mitigation Measure AQ-7: Diesel Locomotive Emission Standards
- Mitigation Measure AQ-8: Diesel Locomotive Low Emission Retrofits
- Mitigation Measure AQ-9: Alternative Fuels for Diesel Locomotives
- Mitigation Measure AQ-10: Electrification of the Eagle Mountain Railway
- Mitigation Measure AQ-11: Landfill Equipment Operating Procedures
- Mitigation Measure AQ-12: Diesel Fuel for Landfill Equipment
- Mitigation Measure AQ-13: On-Highway Engines for Landfill Equipment
- Mitigation Measure AQ-14: Low NOx Engine Design for Landfill Equipment
- Mitigation Measure AQ-15: Construction Equipment Emission Standards
- Mitigation Measure AQ-16: Electrification of Landfill Equipment
- Mitigation Measure AQ-17: Control of Flare Emissions
- Mitigation Measure AQ-18: Temporary Road Surfaces
- Mitigation Measure AQ-19: Transitional Road Surfaces
- Mitigation Measure AQ-20: Permanent Road Surfaces
- Mitigation Measure AQ-21: Tailing and Overburden Excavation
- Mitigation Measure AQ-22: Miscellaneous Fugitive Dust Sources
- Mitigation Measure AQ-23: Wind Erosion
- Mitigation Measure AQ-24: Offsite Paved Roads
- Mitigation Measure AQ-25: Material Processing Plants
- Mitigation Measure AQ-26: Air Quality Monitoring System

5.2.7 Project Impacts (With Mitigation)

5.2.7.1 Total Project Emissions

Table 5-13 summarizes the total project emissions for the Rail Access Only Alternative with mitigation.

Table 5-13
Total Project Emissions
Rail Access Only Alternative With Mitigation

Activity	(lbs/day) NOx	CO	PM10	VOC	SO2	(tons/yr) NOx	CO	PM10	VOC	SO2
Offsite Sources										
Trains	3,377	1,170	206	342	157	616	214	38	62	29
Subtotal, Offsite	3,377	1,170	206	342	157	616	214	38	62	29
Onsite Sources										
Trains	104	50	5	14	4	19	9	1	2	1
Townsite	98	1,022	8	83	8	18	187	2	15	1
Onsite Vehicle Exhaust	1,070	609	95	130	78	195	111	17	24	14
Onsite Fugitive Dust			509					93		
Landfill Gas Flares	1,138	813	723	331	421	208	148	132	60	77
Fugitive Landfill Gas				280					51	
Maintenance Shop			0	12				0	2	
Emergency Generators	4	29	0	0	0	0	1	0	0	0
Fuel Storage Tanks				2					0	
Leachate/Condensate Storage Tanks				0					0	
Locomotive Sand Silo			0					0		
Subtotal, Onsite	2,414	2,523	1,340	852	512	440	456	245	156	93
PROJECT TOTAL	5,791	3,693	1,546	1,194	669	1,056	670	283	218	122

5.2.7.2 Effects of Mitigation

Table 5-14 shows the effect of the recommended mitigation measures on total project emissions.

The data show that the recommended mitigation measures have the greatest benefits for reducing emissions of oxides of nitrogen and sulfur dioxide. The oxides of nitrogen reductions are due to the use of low NOx emitting engines in locomotives and on-site landfill equipment. The NOx reductions associated with the use of a urea injection system on the flare at maximum flare gas production levels are not shown as a credit in these tables, since they have been incorporated into the project design and are reflected in all estimates of project emissions. This is because it is anticipated that this level of control may be required by regulation at the future date.

The sulfur dioxide reductions are due to the use of ultra-low sulfur fuel in locomotives. The use of this fuel results in associated reductions in particulate matter emissions as well. The project design reflects the particulate and sulfur dioxide reductions for the use of low-sulfur fuel in onsite mobile equipment, since this fuel is required by CARB regulations.

In addition, the project design reflects substantial reductions (see detailed calculations in Attachment A, up to 95%) in particulate emissions due to a variety of dust suppression techniques, since it is likely that these measures would be required in order to comply with South Coast Air Quality Management District requirements. Consequently, all estimates of project emissions (with and without mitigation) reflect these reductions.

Reductions in carbon monoxide and volatile organic compounds (hydrocarbons) are expected beyond those already included in the project design to ensure that flare gas emissions of that pollutant do not exceed applicable regulatory trigger levels (i.e., oxidation catalyst). These reductions are due to the use of low CO and VOC emitting engines in locomotives.

5.2.7.3 Ambient Impacts near Landfill Site

Table 5-15 shows a re-analysis of the project's air quality impacts which reflect the mitigation measures. The data indicate that the Rail Access Only Alternative's mitigated impacts would represent the following fractions of the most stringent ambient air quality standards for each pollutant:

Carbon Monoxide	7%
Nitrogen Dioxide	53%
Sulfur Dioxide	10%
Fine Particulates (PM_{10})	64%

Table 5-14
Eagle Mountain Landfill and Recycling Center
Rail Access Only Alternative
Effect of Mitigation on Emissions
(tons/yr)

Activity	NOx	CO	PM_{10}	VOC	SOx
Without Mitigation					
Trains	2186	321	49	103	166
Townsite	18	187	2	15	1
Onsite Vehicle Exhaust	507	87	29	26	16
Onsite Fugitive Dust			93		
Landfill Gas Flare Emissions	208	148	132	64	77
Fugitive Landfill Gas				51	
Emergency Generators	0	1	0	0	0
Maintenance Paint Shop			2	2	
Locomotive Sand Silo			0		
Leachate/Condensate Tanks				0	
Fuel Storage and Dispensing				0	
Total Emissions	2920	745	305	259	261
With Mitigation					
Trains	635	223	39	64	30
Townsite	18	187	2	15	1
Onsite Vehicle Exhaust	195	111	17	24	14
Onsite Fugitive Dust			93		
Landfill Gas Flares	208	148	132	64	77
Fugitive Landfill Gas				51	
Emergency Generators	0	1	0	0	0
Maintenance Paint Shop			0	2	
Locomotive Sand Silo			2		
Leachate/Condensate Tanks				0	
Fuel Storage and Dispensing				0	
Total Emissions	1056	670	283	218	122
Reduction Due to Mitigation					
Emissions (tons)	1864	75	22	42	139
Percent Reduction	64%	10%	7%	16%	53%

Table 5-15
Eagle Mountain Landfill and Recycling Center
Rail Access Only Alternative With Mitigation
Ambient Air Quality Impacts

Pollutant/ Averaging Time	California Standards	National Standards	EPA Class II Increments ($\mu g/m^3$)	Modeled Ambient Impact[1] ($\mu g/m^3$)	Ambient Background Levels[2] ($\mu g/m^3$)	Combined Levels ($\mu g/m^3$)
NOx						
1-hour	470	-	-	237	75	312
Annual	-	100	25	12	6	18
SO_2						
1-hour	655	-	-	31	213	244
3-hour	-	1300	512	30	-	-
24-hour	105	365	91	10	34	44
Annual	-	80	20	1	11	12
CO						
1-hour	23,000	40,000	-	1,603	10,354	11,957
8-hour	10,000	10,000	25	596	4,304	4,900
PM_{10}						
24-hour	50	150	30	32[3]	210	242
Annual	30	50	17	5	22	27

Footnote:

1 Calculated based on ambient impacts shown in Part 4 for Proposed Project with mitigation and relative onsite emissions between Proposed Project with mitigation and Rail Access Only Alternative with mitigation.

2 For NO_x, CO, and PM_{10}, maximum levels monitored at the Project Site. Because ambient SOx levels were not measured at the Project Site, background SOx levels are the maximum monitored within the SEDAB.

3 The maximum allowable Class II PM_{10} increment may be exceeded during one 24-hour period at any one location. For the mitigated project, the Class II increment was not exceeded more than once at any location.

These levels are predictions of the worst-case project impacts at any location outside of the project boundary. These concentrations are projected, in the absence of mitigation measures, at a location north, northwest and west of the community of Eagle Mountain.

5.2.7.4 Impacts at a Typical Rail Crossing

Impacts at typical rail crossings under the Rail Access Only Alternative would be identical to those discussed in Part 4 for the Proposed Project.

5.2.7.5 Impacts on Joshua Tree National Park

A separate analysis of the ambient impacts on the Joshua Tree National Park was also performed with a detailed discussion of the analysis included as in Part 6.

5.2.7.6 Cumulative Impacts at the Project Site

A detailed analysis of the cumulative impacts at the Project Site for the Rail Access Only Alternative with mitigation is included in Part 8.

5.2.8 Assessment of Significance

5.2.8.1 Significance Comparison Tables

Ozone. Table 5-16 compares the impacts of the Rail Access Only Alternative with various significance criteria for ozone. In this table, hydrocarbon and NOx emissions are used to evaluate the significance of ozone impacts; there are no approved techniques available which can be used to estimate the change in ambient ozone concentrations due to any of the alternatives. As shown in Table 5-16, many of the emission and concentration based significance thresholds are exceeded by this project alternative with and without mitigation. As such, the Rail Access Only Alternative would be expected to have a significant impact on ozone, due to increases in hydrocarbon and NOx emissions.

Nitrogen Dioxide. Table 5-17 compares the impacts of the Rail Access Only Alternative with various significance criteria for nitrogen dioxide. The data show that this project alternative results in significant impacts for this pollutant when compared

Carbon Monoxide. The impact of the Rail Access Only Alternative on carbon monoxide is shown in Table 5-18. Once again, the data show that this project alternative results in significant impacts for this pollutant when compared to a zero baseline due to exceedances of many of the emission/concentration based significance thresholds.

Sulfur Dioxide. Table 5-19 shows the impacts of the Rail Access Only Alternative on sulfur dioxide. Once again, the data show that this project alternative results in significant impacts for this pollutant when compared to a zero baseline due to exceedances of many of the emission/concentration based significance thresholds.

Particulate Sulfates. Since particulate sulfates are formed in the atmosphere from emissions of sulfur dioxide, conclusions regarding the significance of sulfur dioxide impacts would be applicable to sulfates as well.

Fine Particulates. The impacts on fine particulates of the Rail Access Only Alternative are shown in Table 5-20. Once again, the data show that this

Table 5-16
Assessment of Significance for Hydrocarbons/Oxides of Nitrogen/Ozone
Eagle Mountain Landfill and Recycling Center
Rail Access Only Alternative

Measure of Significance	Level	HC Without Mitigation	HC With Mitigation	NOx Without Mitigation	NOx With Mitigation
Hydrocarbon/Oxides of Nitrogen Emissions-Based Measures - Industrial Sources					
AQMD Major Source	25 tons/year	259	179	2920	1056
AQMD Major Modification	25 tons/year	259	179	2920	1056
AQMD BACT	0 lbs/day	1418	979	16001	5791
AQMD Offsets	4 tons/year	259	179	2920	1056
AQMD CEQA	55 lbs/day	1418	979	16001	5791
AQMD Major PSD	25 tons/year	259	179	2920	1056
AQMD Significant Increase PSD	25 tons/year	259	179	2920	1056
EPA Major Source	100 tons/year	259	179	2920	1056
EPA Major Modification	40 tons/year (VOC)	259	179	2920	1056
EPA Major Modification	50 tons/year (NMOC)	51	51	N/A	N/A
Ozone Concentration-Based Measures - Industrial Sources					
None	N/A	N/A	N/A	N/A	N/A
Ozone Measurement Accuracy and Reporting Precision					
ARB Accuracy	0.54 pphm	N/A	N/A	N/A	N/A
ARB Reporting	1 pphm	N/A	N/A	N/A	N/A

to a zero baseline due to exceedances of many of the emission/concentration based significance thresholds.

Table 5-17
Assessment of Significance for Oxides of Nitrogen
Eagle Mountain Landfill and Recycling Center
Rail Access Only Alternative

Measure of Significance	Level	Without Mitigation	With Mitigation
Emissions-Based Measures - Industrial Sources			
AQMD Major Source	25 tons/year	2920	1056
AQMD Major Modification	25 tons/year	2920	1056
AQMD BACT	0 lbs/day	16001	5791
AQMD Offsets	4 tons/year	2920	1056
AQMD CEQA	55 lbs/day	16001	5791
AQMD Major PSD	25 tons/year	2920	1056
AQMD Significant Increase PSD	25 tons/year	2920	1056
AQMD RECLAIM	4 tons/year	2920	1056
EPA Major Source	100 tons/year	2920	1056
EPA Major Modification	40 tons/year	2920	1056
Concentration-Based Measures - Industrial Sources			
AQMD Offset Modeling 1-hr	20 $\mu g/m^3$	294	237
AQMD/EPA Class I Annual	2.5 $\mu g/m^3$	<2*	<1*
AQMD/EPA Class II Annual	25 $\mu g/m^3$	20	12
EPA de Minimis Annual	14 $\mu g/m^3$	20	12
EPA Significant Annual	1 $\mu g/m^3$	20	12
Nitrogen Dioxide Measurement Accuracy and Reporting Precision			
ARB Accuracy 1-Hr	0.18 pphm	16	13
ARB Report 1-Hr	1.0 pphm	16	13
ARB Report Annual	0.1 pphm	1	1
*Maximum for Class I area (Joshua Tree National Park)			

Table 5-18
Assessment of Significance for Carbon Monoxide
Eagle Mountain Landfill and Recycling Center
Rail Access Only Alternative

Measure of Significance	Level	Without Mitigation	With Mitigation
Emissions-Based Measures - Industrial Sources			
AQMD Major Source	100 tons/year	745	670
AQMD Major Modification	100 tons/year	745	670
AQMD BACT	0 lbs/day	4107	3693
AQMD Offsets	29 tons/year	745	670
AQMD CEQA	550 lbs/day	4107	3693
AQMD Major PSD	25 tons/year	745	670
AQMD Significant Increase PSD	25 tons/year	745	670
EPA Major Source	250 tons/year	745	670
EPA Major Modification	100 tons/year	745	670
Concentration-Based Measures - Industrial Sources			
AQMD Offset Modeling	1,100 $\mu g/m^3$ 1-Hr 500 $\mu g/m^3$ 8-Hr	1666 620	1603 596
EPA de Minimis 8-Hr	575 $\mu g/m^3$	620	596
EPA Significant 8-Hr	500 $\mu g/m^3$	620	596
EPA Significant 1-Hr	2,000 $\mu g/m^3$	1666	1613
Measurement Accuracy and Reporting Precision			
ARB Accuracy 1-Hr	0.02 ppm	1	1
ARB Report 1-Hr	1 ppm	1	1
ARB Report 8-Hr	0.1 ppm	1	1

Table 5-19
Assessment of Significance for Sulfur Dioxide
Eagle Mountain Landfill and Recycling Center
Rail Access Only Alternative

Measure of Significance	Level	Without Mitigation	With Mitigation
Emissions-Based Measures - Industrial Sources			
AQMD Major Source	100 tons/year	261	122
AQMD Major Modification	40 tons/year	261	122
AQMD BACT	0 lbs/day	1429	6698
AQMD Offsets	4 tons/year	261	122
AQMD CEQA	150 lbs/day	1429	6968
AQMD Major PSD	25 tons/year	261	122
AQMD Significant Increase PSD	25 tons/year	261	122
AQMD RECLAIM	4 tons/year	261	122
EPA Major Source	100 tons/year	261	122
EPA Major Modification	40 tons/year	261	122
Concentration-Based Measures - Industrial Sources			
AQMD Offset Modeling 24-hr	1 $\mu g/m^3$	11	10
AQMD Class I Annual	2 $\mu g/m^3$	<1*	<1*
AQMD Class I 24-Hr	5 $\mu g/m^3$	<3*	<3*
AQMD Class I 3-Hr	25 $\mu g/m^3$	<3*	<3*
AQMD Class II Annual	20 $\mu g/m^3$	2	1
AQMD Class II 24-Hr	91 $\mu g/m^3$	11	10
AQMD Class II 3-Hr	512 $\mu g/m^3$	33	30
EPA Class I Annual	2 $\mu g/m^3$	<1*	<1*
EPA Class I 24-Hr	5 $\mu g/m^3$	<3*	<3*
EPA Class I 3-Hr	25 $\mu g/m^3$	<9*	<9*
EPA de Minimis 24-Hr	13 $\mu g/m^3$	11	10
EPA Significant Annual	1 $\mu g/m^3$	2	1
EPA Significant 24-Hr	5 $\mu g/m^3$	11	10
EPA Significant 3-Hr	25 $\mu g/m^3$	33	30
Measurement Accuracy and Reporting Precision			
ARB Accuracy 1-Hr	0.33 pphm 1-Hr	1	1
ARB Reporting 1-Hr	1 pphm 1-Hr	1	1
*Maximum for Class I area (Joshua Tree National Park)			

Table 5-20
Assessment of Significance for Fine Particulate (PM_{10})
Eagle Mountain Landfill and Recycling Center
Rail Access Only Alternative

Measure of Significance	Level	Without Mitigation	With Mitigation
Directly Emitted PM_{10} Emissions-Based Measures - Industrial Sources			
AQMD Major Source	100 tons/year	305	283
AQMD Major Modification	15 tons/year	305	283
AQMD BACT	0 lbs/day	1671	1546
AQMD Offsets	4 tons/year	305	283
AQMD Major PSD	25 tons/year	305	283
AQMD Significant Increase PSD	15 tons/year	305	283
EPA Major Source	100 tons/year	305	283
EPA Major Modification	15 tons/year	305	283
Concentration-Based Measures - Industrial Sources			
AQMD Offset Modeling	1 $\mu g/m^3$	-	-
AQMD Class I Annual	5 $\mu g/m^3$	<1*	<1*
AQMD Class I 24-Hr	10 g/m^3	<7*	<6*
AQMD Class II Annual	19 $\mu g/m^3$	5	5
AQMD Class II 24-Hr	37 $\mu g/m^3$	34	32
EPA Class I Annual	4 $\mu g/m^3$	<1*	<1*
EPA Class I 24-Hr	8 $\mu g/m^3$	<7*	<6*
EPA Class II Annual	17 $\mu g/m^3$	5	5
EPA Class II 24-Hr	30 $\mu g/m^3$	34	32
EPA de Minimis 24-Hr	17 $\mu g/m^3$	34	32
EPA Significant Annual	1 $\mu g/m^3$	5	5
EPA Significant 24-Hr	8 $\mu g/m^3$	34	32
Measurement Accuracy and Reporting Precision			
ARB Accuracy 24-Hr	1.2 $\mu g/m^3$	32	32
ARB Reporting 24-Hr	1 $\mu g/m^3$	32	32
ARB Reporting Annual	0.1 $\mu g/m^3$	5	5
*Maximum for Class I area (Joshua Tree National Park)			

5.2.8.2 Regional Visibility

Regional visibility is affected by emissions of hydrocarbons, oxides of nitrogen, sulfur dioxide, and particulate matter. A detailed analysis of the Proposed Project's impacts on regional visibility is included in Part 6 for the Joshua Tree National Park impact analysis. Based on this analysis, the Proposed Project would not be expected to have a noticeable change in regional visibility. Because the onsite emissions for the Project Alternative are similar to the Proposed Project, this Alternative would also be expected to have similar regional visibility impacts.

5.2.8.3 Acid Deposition

Acid deposition in California results from pollutants formed from oxides of nitrogen and sulfur oxides emissions. A detailed analysis of acid deposition for the Proposed Project is included in Part 6 for the Joshua Tree National Park impact analysis. Based on this analysis, the Proposed Project would not have a significant impact on acid deposition. Because the onsite emissions for this project alternative are similar to the Proposed Project, this Alternative would also be expected to have similar impacts.

5.2.8.4 Toxic Air Pollutants

Each of the project alternatives is expected to have the same impact with respect to air toxics, which are associated with the combustion of flare gases. Although the analyses presented in this report assume that landfill gas generation rates would be the same for both in-basin and desert sites, the drier climate and lower moisture content in the waste would be expected to result in lower generation rates for the desert site alternatives. The lower gas generation rates would result in less flaring, which in turn would mean lower emissions of toxic air contaminants.

The screening level risk assessment shown in Attachment C indicates that the risk from toxic air contaminants associated with the Proposed Project is greater than a one in a million level which is typically assumed to represent a significant impact.

Based on all of these factors, a significant impact is expected from toxic air contaminants for the Rail Access Only Alternative as well.

5.2.8.5 Global Warming

"Greenhouse" gases which could contribute to the global warming effect are generated by the operation of landfill equipment, the flaring of landfill gases, and the transportation of waste material.

The Rail Access Only Alternative results in a 9% reduction of "greenhouse" gas emissions for the operation of landfill equipment, as compared with the Proposed

5.3.3 Emissions - Operation

5.3.3.1 Solid Waste Transport

Under the Alternate Road Alignment Alternative, solid waste will be transported to landfill by rail and truck. The configurations of the trains will be the same under the Alternate Road Alignment Alternative as described above for the Proposed Project with rail emissions unchanged from those shown for the Proposed Project in Part 4. Due to the slightly longer haul distances, the truck haul emissions for the Alternate Road Alignment Alternative will be higher than the levels shown for the Proposed Project. Table 5-21 summarizes the truck haul emissions associated with the project alternative with detailed emissions calculations included in Attachment A.

5.3.3.2 On-Site Material Handling (except Fugitive Dust)

The onsite mobile emissions will be the same as for the Proposed Project. These emission estimates are discussed in Part 4.

5.3.3.3 Landfill Gas Generation and Combustion

Estimates of landfill gas generation, and associated emissions impacts, are the same for the Alternate Road Alignment Alternative as for the Proposed Project. These estimates are discussed in Part 4.

5.3.3.4 Fugitive Dust

Fugitive dust emissions for the Alternate Road Alignment Alternative are the same as for the Proposed Project. These emission estimates are discussed in Part 4.

5.3.3.5 Miscellaneous Sources

Estimates of emissions for miscellaneous emission sources, such as emergency generators, fuel storage and dispensing, and a maintenance paint shop, are the same for the Alternate Road Alignment Alternative as for the Proposed Project. These estimates are discussed in Part 4.

5.3.3.6 Townsite

The estimate of emissions for the development of the Eagle Mountain Townsite for the Alternate Road Alignment Alternative will be the same as those discussed in Part 4 for the Proposed Project.

Table 5-21
Total Project Emissions Without Mitigation
Alternate Road Alignment Alternative

Activity	(lbs/day) NOx	CO	PM10	VOC	SO2	(tons/yr) NOx	CO	PM10	VOC	SO2
Offsite Sources										
Trains	11,761	1,673	264	527	889	2,146	305	48	96	162
On-Highway Trucks	1,003	481	136	101	28	183	88	25	18	5
Subtotal, Offsite	12,764	2,154	400	628	917	2,329	393	73	114	167
Onsite Sources										
Trains	220	90	7	39	24	40	16	1	7	4
On-Highway Trucks	48	7	3	6	1	9	1	1	1	0
Townsite	98	1,022	8	83	8	18	187	2	15	1
Onsite Vehicle Exhaust	3,020	521	173	156	95	551	95	32	29	17
Onsite Fugitive Dust			560					102		
Landfill Gas Flares	1,264	903	803	368	468	231	165	147	67	85
Fugitive Landfill Gas				311					57	
Maintenance Shop			1	12				0	2	
Emergency Generators	4	29	0	0	0	0	1	0	0	0
Fuel Storage Tanks				2					0	
Leachate/Condensate Storage Tanks				0					0	
Locomotive Sand Silo			0					0		
Subtotal, Onsite	4,654	2,573	1,554	978	596	849	465	284	178	109
PROJECT TOTAL	17,418	4,727	1,954	1,606	1,513	3,178	858	357	293	276

5.3.4 Project Impacts (Without Mitigation)

5.3.4.1 Total Project Emissions

Total emissions for all sources under the Alternate Road Alignment Alternative at maximum projected operating levels are shown in Table 5-21. These emission levels include controls that the project must incorporate in order to comply with the SCAQMD and U.S. EPA emission standards.

5.3.4.2 Ambient Impacts Near the Landfill Site

Because the emission estimates for onsite sources are identical for both the Alternate Road Alignment Alternative and the Proposed Project, the ambient impacts for both projects will also be identical. The ambient impact analysis for the Proposed Project is discussed in Part 4.

5.3.4.3 Impacts at a Typical Rail Crossing

Impacts at typical rail crossings under the Alternate Road Alignment Alternative would be identical to those discussed in Part 4 for the Proposed Project.

5.3.4.4 Impacts on Joshua Tree National Park

Impacts at the Joshua Tree National Park under the Alternate Road Alignment Alternative will be identical to those discussed in Part 4 for the Proposed Project.

5.3.4.5 Cumulative Impacts at the Project Site

A detailed analysis of the cumulative impacts at the Project Site for the Alternate Road Alignment Alternative without mitigation is included in Part 8.

5.3.5 Consistency with Regulatory Programs

5.3.5.1 Consistency with Federal Requirements

Prevention of Significant Deterioration. The determination as to whether the Alternate Road Alignment Alternative will be subject to Prevention of Significant Deterioration (PSD) review will be identical to the conclusion reached in Part 4 for the Proposed Project.

New Source Performance Standards for Non-Metallic Mineral Processing Plants (40CFR, Part 60, Subpart 000). As in the case of the Proposed Project, the material processing plants under the Alternate Road Alignment Alternative would be subject to, and is expected to comply with, this applicable federal New Source Performance Standard.

New Source Performance Standard for Municipal Solid Waste Landfills (40CFR, Part 60, Subpart WWW). As in the case of the Proposed Project, the Alternate Road Alignment Alternative will be subject to, and is expected to comply with, this federal New Source Performance Standard.

National Emissions Standards for Hazardous Air Pollutants (40CFR, Part 61). There are no National Emissions Standards applicable to this project alternative.

Title V Operating Permits Program (40CFR, Part 70). This program establishes a comprehensive operating permit program for Major stationary sources. Since the only purpose of the Title V regulation is to combine all applicable requirements from other air quality regulatory programs into a single permit, there are no additional emission limits or control technology requirements imposed by the program. This project alternative will be subject to the Title V permit program.

5.3.5.2 Consistency with Local Requirements

Prohibitory Rules. The South Coast Air Quality Management District limits the emissions of various pollutants from many sources in the District, including landfill flares and other gas combustion devices. These rules will apply to this project alternative, and the project alternative has been designed to comply with them. A detailed discussion of these rules is included in Part 4. The applicable rules are shown below.

- Rule 53 (Specific Air Contaminants)
- Rule 201 (Permits to Construct)
- Rule 202 (Permits to Operate)
- Rule 401 (Visible Emissions)
- Rule 402 (Nuisance)
- Rule 403 (Fugitive Dust)
- Rule 404 (Particulate Matter - Concentration)
- Rule 405 (Solid Particulate Matter - Weight)
- Rule 407 (Liquid and Gaseous Air Contaminants)
- Rule 409 (Combustion Contaminants)
- Rule 431.1 (Sulfur Content of Gaseous Fuels)
- Rule 461 (Gasoline Transfer and Dispensing)
- Rule 474 (Fuel-Burning Equipment - Oxides of Nitrogen)
- Rule 481 (Spray Coating Operations)
- Rule 1107 (Coating of Metal Parts and Products)
- Rule 1150 (Excavation of Landfill Sites)
- Rule 1150.1 (Control of Gaseous Emissions from Active Landfills)
- Rule 1171 (Solvent Cleaning Operations)

Regulation IX (New Source Performance Standards). The South Coast Air Quality Management District has adopted by reference the federal New Source Performance Standards. A discussion of the applicable federal New Source Performance Standards is included in Part 4.

Regulation X (National Emission Standards for Hazardous Air Pollutants). The South Coast Air Quality Management District has adopted by reference the federal National Emissions Standards for Hazardous Air Pollutants. A discussion of the applicable federal New Source Performance Standards is included in Part 4.

Regulation XIII (New Source Review). The South Coast Air Quality Management District New Source Review rules (contained in Regulation II and Regulation XIII of the SCAQMD Rules and Regulations) govern the preconstruction review of new and modified stationary sources that emit nonattainment pollutants. The discussion of this rule in Part 4 with respect to the Proposed Project would apply to the Alternate Road Alignment Alternative as well.

Regulation XIV (Toxics). Rule 1401 will require that a health risk assessment be performed for permit units required to undergo new source review according to Regulation XIII. The discussion of this rule in Part 4 with respect to the Proposed Project would apply to the Alternate Road Alignment Alternative as well.

Regulation XVII (Prevention of Significant Deterioration). The discussion of this rule in Part 4 with respect to the Proposed Project would apply to the Alternate Road Alignment Alternative as well.

Regulation XX (RECLAIM). The discussion of this rule in Part 4 with respect to the Proposed Project would apply to the Alternate Road Alignment Alternative as well.

Regulation XXX (Title V Permits). The discussion of this rule in Part 4 with respect to the Proposed Project would apply to the Alternate Road Alignment Alternative as well.

5.3.6 Mitigation

The same mitigation measures discussed above for the Proposed Project would be applicable to the Alternate Road Alignment Alternative. The same mitigation measures recommended for the Proposed Project are recommended as well for the Alternate Road Alignment Alternative. These measures are listed below and discussed in more detail in Part 4.

- Mitigation Measure AQ-1: Truck Emission Standards
- Mitigation Measure AQ-2: Diesel Fuel Quality

- Mitigation Measure AQ-3: South Coast Air Quality Management District Smoke Enforcement Program
- Mitigation Measure AQ-4: California Highway Patrol Diesel Truck Inspection Program
- Mitigation Measure AQ-5: Locomotive Operating Procedures
- Mitigation Measure AQ-6: Diesel Fuel for Locomotive Operations
- Mitigation Measure AQ-7: Diesel Locomotive Emission Standards
- Mitigation Measure AQ-8: Diesel Locomotive Low Emission Retrofits
- Mitigation Measure AQ-9: Alternative Fuels for Diesel Locomotives
- Mitigation Measure AQ-10: Electrification of the Eagle Mountain Railway
- Mitigation Measure AQ-11: Landfill Equipment Operating Procedures
- Mitigation Measure AQ-12: Diesel Fuel for Landfill Equipment
- Mitigation Measure AQ-13: On-Highway Engines for Landfill Equipment
- Mitigation Measure AQ-14: Low NOx Engine Design for Landfill Equipment
- Mitigation Measure AQ-15: Construction Equipment Emission Standards
- Mitigation Measure AQ-16: Electrification of Landfill Equipment
- Mitigation Measure AQ-17: Control of Flare Emissions
- Mitigation Measure AQ-18: Temporary Road Surfaces
- Mitigation Measure AQ-19: Transitional Road Surfaces
- Mitigation Measure AQ-20: Permanent Road Surfaces
- Mitigation Measure AQ-21: Tailing and Overburden Excavation
- Mitigation Measure AQ-21: Miscellaneous Fugitive Dust Sources
- Mitigation Measure AQ-22: Wind Erosion
- Mitigation Measure AQ-23: Offsite Paved Roads
- Mitigation Measure AQ-25: Material Processing Plants
- Mitigation Measure AQ-26: Air Quality Monitoring System

5.3.7 Project Impacts (With Mitigation)

5.3.7.1 Total Project Emissions

Table 5-22 summarizes the emissions for the Alternate Road Alignment Alternative with mitigation.

5.3.7.2 Effects of Mitigation

Table **5-23**shows the effect of the recommended mitigation measures on total project emissions.

The data show that the recommended mitigation measures have the greatest benefits for reducing emissions of oxides of nitrogen and sulfur dioxide. The oxides of nitrogen reductions are due to the use of low NOx emitting engines in locomotives and on-site landfill equipment. The NOx reductions associated with the use of a urea injection system on the flare at maximum flare gas production levels are not shown as

Table 5-22
Total Project Emissions
Alternate Road Alignment Alternative With Mitigation

Activity	(lbs/day) NOx	CO	PM10	VOC	SO2	(tons/yr) NOx	CO	PM10	VOC	SO2
	Offsite Sources									
Trains	3,377	1,170	206	342	157	616	214	38	62	29
On-Highway Trucks	1,003	481	136	101	28	183	88	25	18	5
Subtotal, Offsite	4,380	1,651	342	443	185	799	302	63	80	34
	Onsite Sources									
Trains	104	50	5	14	4	19	9	1	2	1
On-Highway Trucks	3	3	0	0	0	1	0	0	0	0
Townsite	98	1,022	8	83	8	18	187	2	15	1
Onsite Vehicle Exhaust	1,237	764	106	156	95	226	139	19	29	17
Onsite Fugitive Dust			560					102		
Landfill Gas Flares	1,264	903	803	368	468	231	165	147	67	85
Fugitive Landfill Gas				311					57	
Maintenance Shop			0	12				0	2	
Emergency Generators	4	29	0	0	0	0	1	0	0	0
Fuel Storage Tanks				2					0	
Leachate/Condensate Tanks				0					0	
Locomotive Sand Silo			0					0		
Subtotal, Onsite	2,710	2,771	1,483	948	575	494	501	271	173	105
PROJECT TOTAL	7,090	4,422	1,82[illegible]	1,391	760	1,293	803	334	253	139

Table 5-23
Eagle Mountain Landfill and Recycling Center
Alternate Road Alignment Alternative
Effect of Mitigation on Emissions
(tons/yr)

Activity	NOx	CO	PM_{10}	VOC	SOx
Without Mitigation					
Trains	2186	321	49	103	166
Transfer Trucks	192	89	26	89	5
Townsite	18	187	2	15	1
Onsite Vehicle Exhaust	551	95	32	89	17
Onsite Fugitive Dust			102		
Landfill Gas Flare Emissions	231	165	147	67	85
Fugitive Landfill Gas				57	
Emergency Generators	0	1	0	0	0
Maintenance Paint Shop			0	2	
Locomotive Sand Silo			0		
Leachate/Condensate Tanks				0	
Fuel Storage and Dispensing				0	
Total Emissions	3178	858	357	293	276
With Mitigation					
Trains	635	223	39	64	30
Transfer Trucks	184	18	25	18	5
Townsite	18	187	2	15	1
Onsite Vehicle Exhaust	326	139	17	29	17
Onsite Fugitive Dust			102		
Landfill Gas Flares	231	165	147	67	87
Fugitive Landfill Gas				57	
Emergency Generators	0	1	0	0	0
Maintenance Paint Shop			0	2	
Locomotive Sand Silo			0		
Leachate/Condensate Tanks				0	
Fuel Storage and Dispensing				0	
Total Emissions	1293	803	334	253	139
Reduction Due to Mitigation					
Emissions (tons)	1885	55	23	40	137
Percent Reduction	59%	6%	6%	14%	50%

a credit in these tables, since they have been incorporated into the project design and are reflected in all estimates of project emissions. This is because it is anticipated that this level of control may be required by regulation at the future date.

The sulfur dioxide reductions are due to the use of ultra-low sulfur fuel in locomotives. The use of this fuel results in associated reductions in particulate matter emissions as well. The project design reflects the particulate and sulfur dioxide emission reductions associated with the use of low-sulfur fuel for onsite mobile equipment, since the use of this fuel is required by CARB regulations.

In addition, the project design reflects substantial reductions (see detailed calculations in Attachment A, up to 95%) in particulate emissions due to a variety of dust suppression techniques, since it is likely that these measures would be required in order to comply with South Coast Air Quality Management District requirements. Consequently, all estimates of project emissions (with and without mitigation) reflect these reductions.

Reductions in carbon monoxide and volatile organic compounds (hydrocarbons) are expected beyond those already included in the project design to ensure that flare gas emissions of that pollutant do not exceed applicable regulatory trigger levels (i.e., oxidation catalyst). These reductions are due to the use of low emitting engines for the locomotives.

5.3.7.3 Ambient Impacts Near Landfill Site

Because the emission estimates for onsite sources are identical for both the Alternate Road Alignment Alternative and the Proposed Project, the ambient impacts for both projects will also be identical. The ambient impact analysis for the Proposed Project is discussed in Part 4.

5.3.7.4 Impacts at a Typical Rail Crossing

Impacts at typical rail crossings under the Alternate Road Alignment Alternative would be identical to those discussed in Part 4 for the Proposed Project.

5.3.7.5 Impacts on Joshua Tree National Park

Impacts at the Joshua Tree National Park under the Alternate Road Alignment Alternative will be identical to those discussed in Part 4 for the Proposed Project.

5.3.7.6 Cumulative Impacts at the Project Site

A detailed analysis of the cumulative impacts at the Project Site for the Alternate Road Alignment Alternative with mitigation is included in Part 8.

5.3.8 Assessment of Significance

5.3.8.1 Significance Comparison

Ozone. Table 5-24 compares the impacts of the Alternate Road Alignment Alternative with various significance criteria for ozone. As shown in Table 5-24, many of the emission and concentration based significance thresholds are exceeded by this project alternative with and without mitigation. As such, the Alternative Road Alignment Project would be expected to have a significant impact on ozone, due to increases in hydrocarbon and NOx emissions.

Nitrogen Dioxide. Table 5-25 compares the impacts of the Alternate Road Alignment Alternative with various significance criteria for nitrogen dioxide. The data show that this project alternative results in significant impacts for this pollutant when compared to a zero baseline due to exceedances of many of the emission/concentration based significance thresholds.

Carbon Monoxide. The impact of the Alternate Road Alignment Alternative on carbon monoxide is shown in Table 5-26. Once again, the data show that this project alternative results in significant impacts for this pollutant when compared to a zero baseline due to exceedances of many of the emission/concentration based significance thresholds.

Sulfur Dioxide. Table 5-27 shows the impacts of the Alternate Road Alignment Alternative on sulfur dioxide. Once again, the data show that this project alternative results in significant impacts for this pollutant when compared to a zero baseline due to exceedances of many of the emission/concentration based significance thresholds.

Particulate Sulfates. Since particulate sulfates are formed in the atmosphere from emissions of sulfur dioxide, conclusions regarding the significance of sulfur dioxide impacts would also be applicable to sulfates.

Fine Particulates - The impacts on fine particulates of the Alternate Road Alignment Alternative are shown in Table 5-28. Once again, the data show that this project alternative results in significant impacts for this pollutant when compared to a zero baseline due to exceedances of many of the emission/concentration based significance thresholds.

5.3.8.2 Regional Visibility

Regional visibility is affected by emissions of hydrocarbons, oxides of nitrogen, sulfur dioxide, and particulate matter. A detailed analysis of the Proposed Project's impacts on regional visibility is included in Part 6 for the Joshua Tree National Park impact analysis. Based on this analysis, the Proposed Project would not be expected to have

Table 5-24
Assessment of Significance for Hydrocarbons/Oxides of Nitrogen/Ozone
Eagle Mountain Landfill and Recycling Center
Alternate Road Alignment Alternative

Measure of Significance	Level	HC Without Mitigation	HC With Mitigation	NOx without Mitigation	NOx with Mitigation
Hydrocarbon/Oxides of Nitrogen Emissions-Based Measures - Industrial Sources					
AQMD Major Source	25 tons/year	293	253	3178	1293
AQMD Major Modification	25 tons/year	293	253	3178	1293
AQMD BACT	0 lbs/day	1606	1391	17418	7090
AQMD Offsets	4 tons/year	293	253	3178	1293
AQMD CEQA	55 lbs/day	1606	1391	17418	7090
AQMD Major PSD	25 tons/year	293	253	3178	1293
AQMD Significant Increase PSD	25 tons/year	293	253	3178	1293
EPA Major Source	100 tons/year	293	253	3178	1293
EPA Major Modification	40 tons/year (VOC, NOx)	293	253	3178	1293
EPA Major Modification	50 tons/year (NMOC)	57	57	N/A	N/A
Concentration-Based Measures-Industrial Sources					
None	N/A	N/A	N/A	N/A	N/A
Ozone Measurement Accuracy and Reporting Precision					
ARB Accuracy	0.54 pphm	N/A	N/A	N/A	N/A
ARB Reporting	1 pphm	N/A	N/A	N/A	N/A

Table 5-25
Assessment of Significance for Oxides of Nitrogen
Eagle Mountain Landfill and Recycling Center
Alternate Road Alignment Alternative

Measure of Significance	Level	Without Mitigation	With Mitigation
Emissions-Based Measures - Industrial Sources			
AQMD Major Source	25 tons/year	3178	1293
AQMD Major Modification	25 tons/year	3178	1293
AQMD BACT	0 lbs/day	17418	7090
AQMD Offsets	4 tons/year	3178	1293
AQMD CEQA	55 lbs/day	17418	7090
AQMD Major PSD	25 tons/year	3178	1293
AQMD Significant Increase PSD	25 tons/year	3178	1293
AQMD RECLAIM	4 tons/year	3178	1293
EPA Major Source	100 tons/year	3178	1293
EPA Major Modification	40 tons/year	3178	1293
Concentration-Based Measures - Industrial Sources			
AQMD Offset Modeling 1-hr	20 $\mu g/m^3$	323	266
AQMD/EPA Class I Annual	2.5 $\mu g/m^3$	2*	1*
AQMD/EPA Class II Annual	25 $\mu g/m^3$	22	14
EPA de Minimis Annual	14 $\mu g/m^3$	22	1*
EPA Significant Annual	1 $\mu g/m^3$	22	1*
Nitrogen Dioxide Measurement Accuracy and Reporting Precision			
ARB Accuracy 1-Hr	0.18 pphm	17	1*
ARB Report 1-Hr	1.0 pphm	17	1*
ARB Report Annual	0.1 pphm	1	1
*Maximum for Class I area (Joshua Tree National Park)			

Table 5-26
Assessment of Significance for Carbon Monoxide
Eagle Mountain Landfill and Recycling Center
Alternate Road Alignment Alternative

Measure of Significance	Level	Without Mitigation	With Mitigation
Emissions-Based Measures - Industrial Sources			
AQMD Major Source	100 tons/year	858	803
AQMD Major Modification	100 tons/year	858	803
AQMD BACT	0 lbs/day	4727	4422
AQMD Offsets	29 tons/year	858	803
AQMD CEQA	550 lbs/day	4727	4422
AQMD Major PSD	25 tons/year	858	803
AQMD Significant Increase PSD	25 tons/year	858	803
EPA Major Source	250 tons/year	858	803
EPA Major Modification	100 tons/year	858	803
Concentration-Based Measures - Industrial Sources			
AQMD Offset Modeling	1100 $\mu g/m^3$ 1-Hr 500 $\mu g/m^3$ 8-Hr	1,761 655	1,761 655
EPA de Minimis 8-Hr	575 $\mu g/m^3$	655	655
EPA Significant 8-Hr	500 $\mu g/m^3$	655	655
EPA Significant 1-Hr	2,000 $\mu g/m^3$	1,761	1,761
Measurement Accuracy and Reporting Precision			
ARB Accuracy 1-Hr	0.02 ppm	2	2
ARB Report 1-Hr	1 ppm	2	2
ARB Report 8-Hr	0.1 ppm	1	1

Table 5-27
Assessment of Significance for Sulfur Dioxide
Eagle Mountain Landfill and Recycling Center
Alternate Road Alignment Alternative

Measure of Significance	Level	Without Mitigation	With Mitigation
Emissions-Based Measures - Industrial Sources			
AQMD Major Source	100 tons/year	276	139
AQMD Major Modification	40 tons/year	276	139
AQMD BACT	0 lbs/day	1513	760
AQMD Offsets	4 tons/year	276	139
AQMD CEQA	150 lbs/day	1513	760
AQMD Major PSD	25 tons/year	276	139
AQMD Significant Increase PSD	25 tons/year	276	139
AQMD RECLAIM	4 tons/year	276	139
EPA Major Source	100 tons/year	276	139
EPA Major Modification	40 tons/year	276	139
Concentration-Based Measures - Industrial Sources			
AQMD Offset Modeling 24-hr	1 $\mu g/m^3$	12	11
AQMD/EPA Class I Annual	2 $\mu g/m^3$	<1*	<1*
AQMD/EPA Class I 24-Hr	5 $\mu g/m^3$	<3*	<3*
AQMD/EPA Class I 3-Hr	25 $\mu g/m^3$	9*	9*
AQMD Class II Annual	20 $\mu g/m^3$	2	1
AQMD Class II 24-Hr	91 $\mu g/m^3$	12	11
AQMD Class II 3-Hr	512 $\mu g/m^3$	34	36
EPA de minimis 24-Hr	13 $\mu g/m^3$	12	11
EPA Significant Annual	1 $\mu g/m^3$	2	1
EPA Significant 24-Hr	5 $\mu g/m^3$	12	11
EPA Significant 3-Hr	25 $\mu g/m^3$	34	36
*Maximum for Class I area (Joshua Tree National Park)			

Table 5-28
Assessment of Significance for Fine Particulate (PM_{10})
Eagle Mountain Landfill and Recycling Center
Alternate Road Alignment Alternative

Measure of Significance	Level	Without Mitigation	With Mitigation
Directly Emitted PM_{10} Emissions-Based Measures - Industrial Sources			
AQMD Major Source	70 tons/year	357	334
AQMD Major Modification	15 tons/year	357	334
AQMD BACT	0 lbs/day	1954	1825
AQMD Offsets	4 tons/year	357	334
AQMD CEQA	150 lbs/day	1954	1825
AQMD Major PSD	25 tons/year	357	334
AQMD Significant Increase PSD	15 tons/year	357	334
EPA Major Source	100 tons/year	357	334
EPA Major Modification	15 tons/year	357	334
Concentration-Based Measures - Industrial Sources			
AQMD Offset Modeling	1 $\mu g/m^3$	-	-
AQMD Class I Annual	5 $\mu g/m^3$	<1*	<1*
AQMD Class I 24-Hr	10 $\mu g/m^3$	7*	<7*
AQMD Class II Annual	19 $\mu g/m^3$	6	5
AQMD Class II 24-Hr	37 $\mu g/m^3$	38	35
EPA Class I Annual	4 ug/m^3	<1*	<1*
EPA Class I 24-hr	8 $\mu g/m^3$	7*	<7*
EPA Class II Annual	17 $\mu g/m^3$	6	5
EPA Class II 24-hr	30 $\mu g/m^3$	38	35
EPA de Minimis 24-Hr	10 $\mu g/m^3$	38	35
EPA Significant Annual	1 $\mu g/m^3$	6	5
EPA Significant 24-Hr	5 $\mu g/m^3$	38	35
Measurement Accuracy and Reporting Precision			
ARB Accuracy 24-Hr	1.2 $\mu g/m^3$	38	35
ARB Reporting 24-Hr	1 $\mu g/m^3$	38	35
ARB Reporting Annual	0.1 $\mu g/m^3$	6	5

*Maximum for Class I area (Joshua Tree National Park)

a noticeable change in regional visibility. Because the onsite emissions for this project Alternative are similar to the Proposed Project, this Alternative would also be expected to have similar regional visibility impacts.

5.3.8.3 Acid Deposition

Acid deposition in California results from pollutants formed from oxides of nitrogen and sulfur oxides emissions. A detailed analysis of acid deposition for the Proposed Project is included in Part 6 for the Joshua Tree National Park impact analysis. Based on this analysis, the Proposed Project would not have a significant impact on acid deposition. Because the onsite emissions for this project alternative are similar to the Proposed Project, this Alternative would also be expected to have similar impacts.

5.3.8.4 Toxic Air Pollutants

Since onsite toxic air contaminant emissions for this project alternative are identical to the levels estimated for the Proposed Project, the risk impacts are expected to be the same for this project alternative and the Proposed Project. The screening level risk assessment shown in Attachment C indicates that the risk from toxic air contaminants associated with the Proposed Project is greater than a one in a million level which is typically assumed to represent a significant impact. Based on this analysis, a significant impact is expected from toxic air contaminants for the Alternate Road Alignment Alternative as well.

5.3.8.5 Global Warming

"Greenhouse" gases which could contribute to the global warming effect are generated by the operation of landfill equipment, the flaring of landfill gases, and the transportation of waste material.

Overall, the Alternate Road Alignment Alternative would result in the generation of gases which could contribute to global warming. However, the state of knowledge regarding global warming is not adequate to allow an assessment of the significance of the impacts of any individual project at the present time.

5.3.8.6 Overall Assessment of Significance

Based on the analyses contained in the preceding sections, the Alternate Road Alignment Alternative is expected to have a significant effect on air quality. However, as discussed in Part 7, the Alternate Road Alignment Alternative could result in lower emissions in the South Coast Air Basin for all pollutants, at the expense of increased impacts in desert areas. The improvements in the South Coast Air Basin would pass through to the desert areas over the San Gorgonio Pass; however, these benefits would not be sufficient to outweigh the direct adverse impacts in the desert.

5.4 Landfill on Kaiser Land Only Alternative

For this project alternative, the landfill would include only Kaiser-owned lands in and around the East Pit (i.e., Phase 5 of the landfill under the Proposed Project). Emissions for the Landfill on Kaiser Land Only Alternative will be associated with the same activities as the Reduced Volume Alternative. As with the Reduced Volume Alternative, for the Landfill on Kaiser Land Only Alternative activities will occur both offsite, such as rail and truck hauling of waste to the project, and on-site, including all of the operations of the landfill equipment. They will involve both stationary sources, such as the landfill gas flares, and mobile equipment, such as the hostling vehicles used for hauling waste. At maximum operating levels, 10,000 tons per day of waste will be transported to the landfill, with 8,000 tons/day hauled by rail and 2,000 tons/day hauled by truck. Because the amounts of waste hauled by rail are even lower than the levels assumed for the Reduced Volume Alternative, the combined emissions for rail and truck waste hauling will also be lower. The same is true for onsite emission estimates, the Landfill on Kaiser Land Only Alternative will have lower onsite activities, emissions, and corresponding impacts. Consequently, because the emissions estimates both on and offsite are lower for this alternative, the ambient impacts, cumulative impacts, screening level health risk assessment, and assessment of significance would show a lower impact than the Reduced Volume Alternative.

5.5 No Townsite Alternative

This project alternative is identical to the Proposed Project with the exception that the Eagle Mountain Townsite will not be developed. Under this project alternative, it is assumed that the workers at the landfill would commute to the site from local communities such as Desert Center and Blythe. The emissions associated with travel to and from these communities are shown in Table 5-29, with Table 5-30 summarizing the total emissions for this project alternative with mitigation. All discussions in Part 4 for the Proposed Project regarding solid waste transportation, material handling, landfill gas generation, fugitive dust, ambient impacts, cumulative impacts, screening level health risk assessment, regulatory consistency, mitigation, and assessment of significance apply to the No Townsite Alternative as well.

5.6 No Project Alternative

5.6.1 Introduction

The No Project Alternative assumes that Southern California's landfill needs will continue to be met through use of existing and additional capacity within Southern California landfills. Under this alternative, truck traffic associated with residential

and commercial waste pickups would be identical to that associated with the Proposed Project. (These impacts were assumed to be identical for all cases, and thus were not quantified.) In addition, it was assumed that there would be a slight increase in truck travel distances to MRFs/TSs and/or landfills. This assumed increase was based on the estimates of replacement and expanded landfill capacity shown in Table 5-31.

Table 5-29
Vehicle Emissions for Travel
To and From the Project
No Townsite Alternative

Trip Origination	No of Vehicles per day	NOx lbs/day	CO lbs/day	PM_{10} lbs/day	VOC lbs/day	SOx lbs/day
Desert Center	25	1.04	12.99	0.13	0.76	0
Blyth/Indio	225	40.61	278.18	6.66	18.23	0
Total	250	41.65	291.17	6.79	18.99	0

5.6.2 Emissions - Operation

5.6.2.1 Solid Waste Transport

For the No Project Alternative, no use of waste rail hauling was assumed. Using the same on-highway truck emissions factors as shown in Part 4 for the Proposed Project and the vehicle miles traveled shown in Table 5-31, the emissions for truck hauling are summarized in Table 5-32 with detailed emissions calculations included in Attachment A.

5.5.2.2 Landfill Gas Flares

For the No Project Alternative, landfill gas generation was conservatively assumed to be the same as the amount estimated for the Proposed Project, although the higher moisture levels and rainfall in the South Coast Air Basin would be expected to result in more landfill gas generated for each ton of waste buried. Compliance with applicable regulations was assumed for this project alternative; however, the use of the lowest available emission levels and advanced controls to reduce flare emissions was not assumed, as existing flares (or other gas disposal equipment) would be used under the No Project Alternative. Table 5-32 summarizes the landfill gas flare emissions for the No Project Alternative with detailed emission calculations included in Attachment A.

Table 5-30
No Townsite Alternative With Mitigation
Total Project Emissions

Activity	(lbs/day) NOx	CO	PM10	VOC	SO2	(tons/yr) NOx	CO	PM10	VOC	SO2
Offsite Sources										
Trains	3,377	1,170	206	342	157	616	214	38	62	29
Worker Travel	42	291	7	19	0	8	53	1	3	0
On-Highway Trucks	940	451	127	94	26	172	82	23	17	5
Subtotal, Offsite	4,359	1,912	340	455	183	796	349	62	82	34
Onsite Sources										
Trains	104	50	5	14	4	19	9	1	2	1
On-Highway Trucks	3	3	0	0	0	1	0	0	0	0
Onsite Vehicle Exhaust	1,237	764	106	156	95	226	139	19	29	17
Onsite Fugitive Dust			560					102		
Landfill Gas Flares	1,264	903	803	368	468	231	165	147	67	85
Fugitive Landfill Gas				311					57	
Maintenance Shop			0	12				0	2	
Emergency Generators	4	29	0	0	0	0	1	0	0	0
Fuel Storage Tanks				2					0	
Leachate/Condensate Tanks				0					0	
Locomotive Sand Silo			0					0		
Subtotal, Onsite	2,612	1,749	1,475	865	567	476	315	269	158	103

Table 5-31 No Project Alternative Additional Waste Hauled at Average of 20 Tons per Truck					
Origin of Waste	Estimated Capacity[1] tons/day	Trucks per day required	Additional[1] Truck Round Trip Miles	Additional Daily Truck VMT	Additional Annual VMT
Orange County	2,000	100	0	0	0
Riverside County	2,000	100	0	0	0
San Bernardino County	2,000	100	60	6,000	2,190,000
San Gabriel Valley	7,000	350	0	0	0
Central LA/SF Valley	5,000	250	20	5,000	1,825,000
Unknown	2,000	100	0	0	0
Sum	20,000	1,000		11,000	4,015,000
[1] Waste amounts and added haul distances provided by CM Engineering.					

5.5.2.3 Onsite Mobile Equipment

For the No Project Alternative, onsite activities, such as waste handling, landfill working face operations, cover/liner excavation, cover/liner hauling, daily/final cover application, and road maintenance, were assumed to be identical with the level discussed in Part 4 for the Proposed Project without mitigation. Emissions associated with cover processing are not expected to be associated with existing landfills and are expected from the No Project Alternative emission calculations. Consequently, the emissions for these activities for the No Project Alternative are identical to the levels shown for the Proposed Project without mitigation. Table 5-32 summarizes the onsite mobile equipment emissions for the No Project Alternative with detailed emissions calculations included in Attachment A.

5.5.2.4 Fugitive Dust

As with the onsite mobile equipment emissions, for the No Project Alternative the emissions for fugitive dust were assumed to be identical to those levels shown in Part 5 for the Proposed Project without mitigation with the exception of emissions for bench clearing and material processing plants which were excluded from the No Project Alternative. Table 5-32 summarizes the fugitive emissions for the No Project Alternative with detailed emissions calculations included in Attachment A.

5.5.3 Total Project Emissions

Table 5-32 summarizes the total onsite project emissions for the No Project Alternative. The assumptions used to calculate the emissions shown on Table 5-32 are discussed above and included in Attachment A.

Table 5-32
Total Project Emissions
No Project Alternative

Activity	(lbs/day) NOx	CO	PM10	VOC	SO2	(tons/yr) NOx	CO	PM10	VOC	SO2
Offsite Sources										
On-Highway Trucks	460	221	62	46	13	84	40	11	8	2
Subtotal, Offsite	460	221	62	46	13	84	40	11	8	2
Onsite Sources										
Onsite Vehicle Exhaust	4,060	1,540	304	417	84	741	281	55	76	15
Onsite Fugitive Dust			545					100		
Landfill Gas Flares	2,348	7,961	870	2,174	468	429	1,453	159	397	85
Fugitive Landfill Gas(1)				311					57	
Maintenance Shop(1)			1	12				0	2	
Emergency Generators(1)	4	29	0	0	0	0	1	0	0	0
Fuel Storage Tanks(1)				2					0	
Lechate/Condensate Storage Tanks(1)				0					0	
Subtotal, Onsite	6,412	9,531	1,719	2,917	552	1,170	1,735	314	533	101
PROJECT TOTAL	6,872	9,751	1,782	2,963	565	1,253	1,775	325	541	103

Footnotes:
(1) Emissions identical to levels shown for Proposed Project without mitigation.

5.6.4 Project Impacts

Due to the large number of existing landfill sites, it is not reasonably possible to estimate the ambient pollutant concentrations at these sites. Impacts may be either higher or lower than those estimated for the Proposed Project depending on local geography and weather patterns. In lieu of analyzing ambient impacts, the emission levels for the No Project Alternative are discussed above and a comparison of these emissions levels with the other project alternatives is included in Part 7.

5.6.5 Consistency with Regulatory Programs

It is assumed that existing landfill operations are in compliance with all applicable air quality rules and regulations. It is not clear whether the expansions required to continue accommodating the 20,000 tons/day of waste which would otherwise go to the Eagle Mountain Landfill and Recycling Center would require additional air quality permits.

5.6.6 Mitigation

The measures used to control emissions for the Proposed Project without mitigation (Part 4) would also be expected to apply to the No Project Alternative with the exception of the following measures:

- Rather than assume the use of all new onsite landfill equipment as with the Proposed Project without mitigation, for the No Project Alternative it is assumed that an average fleet of landfill equipment will be used.
- Rather than assume the use of new landfill gas flares equipped with urea injection and oxidation catalysts as with the Proposed Project without mitigation, for the No Project Alternative it is assumed that flares meeting average emission levels will be used.

5.6.7 Assessment of Significance

5.6.7.1 Significance Comparison

Because the emissions associated with the No Project Alternative will be divided among a number of existing landfills in Southern California, it is not reasonably possible to estimate the emissions at each existing landfill for purposes of a significance analysis. Emissions will be either above or below the various significant thresholds depending on total emission levels at each site.

5.6.7.2 Regional Visibility

As discussed above, emissions associated with the No Project Alternative will be divided among a number of existing landfills. Consequently, it is not reasonably

possible to estimate the regional visibility impacts at these site. Regional visibility impacts will be either higher or lower than those estimated for the Proposed Project depending on emissions, local geography, and weather patterns.

5.6.7.3 Acid Deposition

As discussed above, emissions associated with the No Project Alternative will be divided among a number of existing landfills. Consequently, it is not reasonably possible to estimate the acid deposition impacts at these site. Acid deposition impacts will be either higher or lower than those estimated for the Proposed Project depending on emissions, local geography, and weather patterns.

5.6.7.4 Toxic Air Pollutants

Each of the project alternatives is expected to have the same impact with respect to air toxics. A detailed screening level risk assessment is included as Attachment C. Although the analyses presented in this report assume that landfill gas generation rates would be the same for both in-basin and desert sites, the more moist climate and higher moisture content in the waste would be expected to result in higher generation rates for the No Project Alternative. The higher gas generation rates would result in more flaring, which in turn would mean higher emissions of toxic air contaminants. However, because the toxic air pollutants for the No Project Alternative will be divided among several existing landfills, it is not reasonably possible to determine the toxic air pollutant impacts at each site.

5.6.7.5 Global Warming

"Greenhouse" gases which could contribute to the global warming effect are generated by the operation of landfill equipment; the flaring of landfill gases; and the transportation of waste material. Overall, the No Project Alternative would result in the generation of gases which could contribute to global warming in an amount less than that generated under the Proposed Project.

5.6.7.6 Overall Assessment of Significance

Because emissions levels associated with the No Project Alternative are of the same magnitude as the onsite emissions estimated for the Proposed Project, the No Project Alternative is expected to have a significant effect on air quality.

PART 6
JOSHUA TREE NATIONAL PARK
AIR QUALITY IMPACT ANALYSIS

6.1. Introduction

This section summarizes the air quality impacts on the Joshua Tree National Park (JTNP) from the Eagle Mountain Landfill and Recycling Center. In estimating the impacts on the JTNP, procedures given in a modeling protocol reviewed by the National Park Service were followed. The impact analysis includes a Level-I Regional Haze analysis, a Level-I Deposition analysis, a Level-III Visibility impact analysis, and a criteria pollutant impact analysis. The modeling protocols followed and the results of the analyses are described in this section. More detailed assumptions, characteristics of sources, variables used and other details of the dispersion modeling runs are contained in Part 4.

6.2. Regional Haze Analysis

The Industrial Source Complex (ISCST3) model was used to determine the project impact on regional haze. The ISCST3 model is a steady-state Gaussian plume model which can be used to assess pollutant concentrations from a wide variety of sources associated with an industrial source complex. The model can account for settling and dry deposition of particulates; downwash; point, area, line and volume sources; plume rise as a function of downwind distance; separation of point sources; and limited terrain adjustment.

Level-I regional haze analyses for any given project are typically initialized with dispersion model results for 1-hour average SO_2 concentrations (assuming no conversion at first) for the most remote corner of the Class-I area from the project. The greatest possible distance, combined with the assumption of low wind speeds, permits ample time for conversion of SO_2 to visibility-reducing sulfates. After close consultation with NPS, the Level I regional haze analysis was performed in the following manner. Twenty-four-hour average SO_2, NOx, and PM_{10} concentrations were determined using ISCST3 for receptors at 50 and 94 km distances along radials running from 250 to 300 degrees from the local coordinate system origin, at the Project Phase I handling yard. (The most remote corner of JTNP is about 94 km from the local origin). Only emissions from the eight flares were considered, as other sources at the site are not likely to contribute to regional haze. Despite the likely absence of excess ammonia required to convert NOx to ammonium nitrate* (because of Eagle Mountain's isolation from sources of biogenic ammonia) the

*Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 1 Report: Interim Recommendation for Modeling Long Range Transport and Impacts on Regional Visibility, EPA-454/R-93-015, April 1993, EPA OAQPS, Appendix B (Method for Calculating Regional Visibility Impairment), page B-1.

complete conversion of NOx to ammonium nitrate was nevertheless assumed. Complete conversion of SO_2 to ammonium sulfate was also assumed. Deposition of primary PM_{10} was considered in estimating concentrations, but deposition of the secondary PM_{10} was ignored.

Using the approach described above, the analysis of the impacts of the Project on regional haze was conducted. Table 6-1 presents the extinction resulting from the primary and secondary particulate, and the calculated regional haze visibility impact of the Project relative to background, in deciviews (dv). Since the flares alone were modeled, impacts for the Project, with or without mitigation, are identical.

Table 6-1
Eagle Mountain Landfill and Recycling Center
Regional Haze Impacts
Proposed Project

	Summer	Winter
Background Visual Range (km)	122	180
Background Extinction (1/km)	0.03207	0.02173
Extinction from Project @ 94 kn	0.00058	0.00058
Extinction from Project @ 50 km	0.00089	0.00089
Regional Haze Visibility Impact @ 94 km	0.180	0.264
Regional Haze Visibility Impact @ 50 km	0.275	0.403
Significance Level	1.0	1.0

The deciview scale, a standard visual index appropriate for characterizing visibility through uniform hazes, is designed to be linear with respect to perceived visual changes throughout its entire range in a manner analogous to the decibel index for sound.

A one dv change is considered to be the threshold for regulatory concern about regional haze impacts. A one dv change represents about a 10% change in extinction coefficient (b-ext), which is a small, but perceptible, scenic change. The maximum calculated change (Table 6-1: 0.40 dv at 50 km using winter assumptions) is quite low. Thus, it is concluded that the Eagle Mountain Project will not have a significant impact on regional haze in the vicinity of JTNP.

Because of the conservative nature of several of the modeling assumptions in this regional haze analysis, particularly the assumed complete conversion of NOx to

ammonium nitrate with respect to transport time, it is expected that actual project impacts would be significantly lower than those shown in Table 6-1. As described above, the analysis was performed with a high degree of conservatism. Consequently, actual project impacts would be expected to be significantly lower than those shown.

6.3. Acid Deposition Analysis

An analysis was conducted to evaluate the impact of acid deposition on the JTNP. The Level-I approach used was based on the Interagency Workgroup on Air Quality Modeling (IWAQM) Phase I report, dated April 1993. In its report, the IWAQM recommends that the approach for other air quality related values be the same approach as the analysis recommended for PSD increment and standards. The following additions are recommended: 1) assume that all of the emitted SO_2 remains as SO_2 and that the NOx has been converted to HNO_3, and 2) use appropriate deposition velocities to estimate the deposition of the pollutants.

The ISCST3 dispersion model estimates were used to initialize SO_2 and NOx concentrations to calculate SO_2 and HNO_3 deposition. Since the available receptors for the dispersion modeling runs were close to the landfill site, and since nitric acid deposition velocities are the highest of the nitrogen species, deposition estimates are conservatively high if considered to apply to all of JTNP.

The nitric acid deposition velocity used was the IWAQM default of 5 cm/s. There are no chemical species in the troposphere for which deposition velocities are higher than about 5 cm/s. The one-hour and annual average ambient concentration impacts for NOx and SO_2 were used to quantify the HNO_3 and SO_2 deposition impacts. The receptor used was the JTNP boundary receptor with the highest concentration for the respective pollutant and averaging period.

Using the approach described above, the analysis of the impacts of the Proposed Project on acid deposition was conducted. Tables 6-2 and 6-3 show the results of the acid deposition analysis for the Proposed Project without and with mitigation, respectively. There are several factors that considerably skew the Level-1 results for nitric acid, leading to an exaggeration of what deposition will actually occur at JTNP from operations at Eagle Mountain. First, deposition velocities for atmospheric trace species are strongly dependent on the nature of the surface concerned as well as meteorological conditions.

Table 6-2
Eagle Mountain Landfill and Recycling Center
Acid Deposition Impacts
Proposed Project Without Mitigation

Substance	Maximum Modeled Concentrations (ug/m3)		Maximum Deposition Rate (kg/hectare)	
	1-hr	annual	1-hr	annual
NOx	387.3	3.26	N/A	N/A
HNO_3	530.7	4.47	0.96	70.5
SO_2	20.5	0.28	0.004	0.45

Table 6-3
Eagle Mountain Landfill and Recycling Center
Acid Deposition Impacts
Proposed Project With Mitigation

Substance	Maximum Modeled Concentrations (ug/m3)		Maximum Deposition Rate (kg/hectare)	
	1-hr	annual	1-hr	annual
NOx	169.8	1.72	N/A	N/A
HNO_3	232.6	2.36	0.42	37.2
SO_2	18.5	0.26	0.003	0.41

Nitric acid deposition, particularly, is a function of time of day*. The default Level-1 deposition velocity of 5 cm/s for HNO_3 is the highest ever recorded over any kind of surface anywhere for any substance, and requires a surface resistance of nearly zero (in general, a wet surface under conditions of neutral stability). For dry, sparsely-vegetated land such as is found in the Mojave Desert, a conservative choice for HNO_3 deposition velocity should be closer to about 1 cm/s. Second, the abstraction of mass from the

* Volder, E.C., et al., A literature review of dry deposition of oxides of sulphur and nitrogen with emphasis on long-range transport modeling in North America, Atmos. Environ., 20, 2101-2123, 1986. Also, Huebert, B.J., and C.H. Robert, The dry deposition of nitric acid to grass, J. Geophys. Res., D90, 2085-2090, 1985.

plume due to deposition is not accounted for by the Level-1 approach, leading to an over-estimation of impacts. Third, all nitrogen species are presumed to be available as HNO_3 and thus ready for deposition. In fact, from an examination of summertime Level-3 PLUVUE-2 plume visibility runs, a typical conversion rate of nitrogen oxides to nitric acid should be approximately 10% per hour, which is rapid, but certainly not instantaneous. Thus, these nitric acid deposition rates probably exceed real-life conditions by at least an order of magnitude, and perhaps more.

In contrast, the Level-1 default deposition velocity for SO_2 of 0.5 cm/s is a reasonable, conservative choice. Since the deposition velocity is lower for SO_2 than for HNO_3, the error caused by not accounting for plume depletion is much more modest. In addition, conversion to another sulfur species need not occur for deposition to proceed.

Because acid deposition contains a variety of chemical components and is deposited in multiple forms (e.g., rain, snow, fog, and as dry particles), it is difficult to determine an acceptable level or standard. Minnesota is the only state that has set an acidic deposition standard to protect sensitive aquatic and terrestrial ecosystems. The standard limits the amount of wet-deposited sulfate (SO_4^{2-}) deposition to an annual total of 11 kg/hectare which would allow only tolerable amounts of acidity to be deposited in the most sensitive lakes in the state. Although we did not estimate the sulfate deposition, it would be conservative to assume that the sulfate deposition rates would be equal or probably less than the SO_2 deposition rates because the deposition velocities for sulfates are sometimes equal to but are generally somewhat lower than SO_2 deposition velocities. The annual SO_2 deposition rates for the Proposed Project are 0.45 kg/hectare for the project without mitigation and 0.41 for the project with mitigation (0.68 and 0.62 kg/hectare sulfate, respectively, when adjusted for molecular weight). This level is significantly lower than the level set by the state of Minnesota. Because the actual project impacts would be expected to be significantly lower than those calculated, the acid deposition impact from SO_2 is not considered to be significant.

It is difficult to determine significance criteria for nitrate deposition. A review article by Bull* cites work by Nilsson** that estimates, by several different methods, a 'critical load'*** for nitrate deposition for sensitive watersheds. All estimates for a critical load fall in the range 5 - 45 kg N/hectare/year, with a value of 15 kg N/hectare/year being typical.

Maximum loads for JTNP of 70.5 kg HNO3/hectare/year for the Proposed Project, or 37.2 kg HNO3/hectare/year for the Mitigated Project (15.5 and 8.2 kg N/hectare/year, respectively, when corrected for molecular weight), calculated with

---

* Bull, K.R., Environ. Pollut., 69, 105-123, 1991.

** Nilsson, J., Acid News, ¾, 9-11, 1986.

*** Critical Load: The highest load that will not cause chemical changes leading to long-term harmful effects on the most sensitive ecological systems.

standard Level-1 IWAQM assumptions, are certainly in the range of the typical critical loads as reported by Bull and Nilsson. As pointed out in this report, however, the concatenation of several very conservative assumptions in the Level-1 analysis leads to a gross over-estimate of the amount of deposition, perhaps by as much as an order of magnitude or more

- Conversion of NOx to HNO_3 is instantaneous;
- Depletion of the plume does not occur, despite deposition; and
- Deposition velocity for nitric acid remains fixed at its highest conceivable level year-round despite changes in meteorological condition,

If the Level-1 deposition results are reduced by an order of magnitude in order to correct for the conservatism in Level-1 assumptions, project impacts (1.6 and 0.8 kg N/hectare/year, respectively, for the Project without and with mitigation) are significantly lower than the critical nitrogen loads estimated by Nilsson for a variety of sensitive, but generally much wetter, watersheds elsewhere in the world. To our knowledge, no critical load for nitrogen has been established for arid regions similar to the Mojave Desert.

Reported values for wet and/or dry-deposited nitrogen (N) and sulfur (S), rates from the California Acid Deposition Monitoring Program are 3.0 to 21.7 kg/ha/yr and 0.4 to 3.2 kg/ha/yr respectively.

All deposition results also suffer some exaggeration from the well-known propensity for Gaussian dispersion models, particularly for short-term averaging periods, to over-estimate concentrations to some extent.* As described above, the analysis was performed with a high degree of conservatism. Consequently, actual project impacts would be expected to be significantly lower than those shown and accordingly, the impact is not considered to be significant.

6.3.1 Impact on Vegetation

The federal secondary standards were established to prevent adverse impacts to the public welfare, including impacts on vegetation. An important part of the impacts analysis is to identify sensitive vegetation that might be affected by deposition of SO_2 and nitrogen compounds.

Acid deposition occurs as acid rain, acid fog, acid cloud water, acid snow, and dry deposition of both gases and particles. Examples of dry deposition include nitric acid vapors, organic acid vapors, and sulfuric acid mist. Acid deposition is a result of the emissions of sulfur and nitrogen oxides. Damage from acid deposition has been widely investigated in the eastern states. In that region, problems include the acidification of lakes and streams and the harmful effects on vegetation, especially forests and grassland, from acid rain incidents. California's acid deposition problems

---

* Turner, D.B., Workbook of Atmospheric Dispersion Estimates, 1970.

are different from those in the East and less severe. California experiences less acid rain because of the limited annual precipitation, compared to the East and because of the buffering effect of alkaline soil particles. Acid fog occurs in urban coastal areas and in the southern San Joaquin Valley. Dry deposition of gases and particles contribute greatly to acid deposition in southern California.

Vegetation effects of acidic deposition should also consider the influence of major gaseous pollutants. High concentrations of photochemical oxidants and rainfall acidity, along with frequency of air stagnation episodes, can result in increased deposition of atmospheric pollutants. Cloud and fog water may enhance pollutant deposition. Decreased forest productivity from photochemical oxidants, principally ozone, has been quantified in the SCAB, including the decline of forests in the San Bernardino Mountains. Information regarding potential effects of acid deposition on vegetation was obtained from laboratory experiments for some sensitive species such as alfalfa, barley, and the ponderosa pine. These observations, however, serve only to outline the effects of acid deposition within a confined environment. Whether or not it has similar impacts within the natural environment in the area of the project or JTNP is a question that remains largely unanswered.

The EIS/EIR for the proposed Eagle Mountain Landfill Project (Appendix F) lists the species observed in the Project area. The three primary plant community types in the Proposed Project area are the Sonoran Creosote Bush Scrub, Desert Dry Wash Woodland, and Desert Chenopod Scrub. No listed state or federal plant species were observed within the bounds of the Proposed Project, and there is no indication of a potential for any state or federal listed plants to occur in the area. One Category 2 candidate plant species was observed within the Proposed Project boundaries: Alverson's foxtail cactus. This cactus was observed along the railroad and Eagle Mountain Road corridor as well. A second Category 2 candidate plant species was observed within the right-of-way corridor of the railroad: Orocopia sage. Plant species of special concern observed within Kaiser Steel Resources parcels include an individual California barrel cactus in the section north of Interstate 10 (I-10) and a population of Orocopia sage in the parcels south of I-10. Two plant species were observed in the railroad corridor which appear only on California Native Plant Society lists: crucifixion thorn and unicorn-plant. In addition to those species identified in the project area, there are species of concern in nearby areas, including the Joshua tree in JTNP, and the ponderosa and Jeffery pine in the San Bernardino Mountains.

The National Park Service (NPS) has identified issues related to the congressional mandates for protection of the national park system, including the protection of the Mojave and Colorado Desert ecosystems. Air resource issues identified by NPS include the following:

1. Compliance with the National Ambient Air Quality Standards (NAAQS)

   Monitoring data show current violations of the ozone standard within portions of the JTNP, and ozone damage to sensitive plant species has been

documented in the JTNP. Also, severe mortality of ponderosa and Jeffery pines in the San Bernardino Mountains has been documented.

2. Impacts of Wet/Dry Deposition of Nitrate on Local Biota

   JTNP currently is experiencing nitrate deposition, most likely from sources in and around the Los Angeles basin. Desert ecosystems by nature are nitrogen deficient environments. Introduction of nitrates may result in reduced freeze tolerance and increased fertilization which disrupt natural community processes. The nitrate loading from Proposed Project operations may impact the existing ecosystem structure.

Ozone probably causes more plant damage in the U.S. than any other pollutant. Ozone is taken into the leaf through the stomata during normal gas exchange. Once inside the leaf, the ozone attacks the cells, causing symptoms to appear on the leaf surface. Injury from ozone has been observed on a wide range of plants, including leafy vegetables, grains and conifers. In three of the SCAB's forest areas, San Bernardino, Angeles and the Santa Monica Mountains, actual damage to vegetation has been attributed to ozone and combinations of ozone and sulfur dioxide. Coniferous damage, as indicated by needle condition, has been observed in the San Bernardino National Forest. In Air Pollution: Its Origin and Control (1976), Kenneth Wark and Cecil F. Warner mention that the injury threshold has been estimated at about 0.03 ppm (59 ug/m^3) for four-hour exposure. Plants such as spinach, pinto beans, tomatoes, and white pines can be even more sensitive. Ozone exceedances in the SCAB are a regional problem and are considered the primary cause of the ozone exceedances downwind or in eastern parts of the SCAB and the Southeast Desert Air Basin due to transport. Ozone increases caused by the project itself are not considered to be significant and will not contribute significantly to this regional transport problem.

Wark and Warner state that "[o]n the basis of several studies, the oxides of nitrogen have been dismissed as a major source of damage to vegetation. Although NOx can cause injury..., it usually must be present in concentrations in excess of those normally found in the ambient atmosphere." Information received from the NPS regarding the nitrogen deposition also indicates that elevated concentrations of nitrogen oxide (NO), nitrogen dioxide (NO_2) and nitrogen-containing byproducts of certain photochemical reactions can be toxic to plants (phytotoxic). Information indicates that fertilization caused by anthropogenic nitrate (NO_3) deposition in the early spring and late fall can make terrestrial plants more susceptible to unseasonable cold snaps. The question is what elevated concentrations will cause such effects. Information also received from the NPS that was prepared by Woodward-Clyde Consultants states that for NO_2 metabolic and growth impacts on plants are not known to occur below about 0.1 ppm (190 ug/m^3 annual average). Potentially adverse impacts can occur only at higher concentrations. On a short-term basis, exposure to concentrations in excess of 550 ug/m^3 for a 3-hour average can cause damage.

Wark and Warner indicate that very sensitive vegetation may be affected by NO_2 concentrations in the 2 to 10 ppm range, and the threshold is estimated to be 2.5 ppm. A more recent evaluation of the literature was conducted by the California Air Resources Board in its report on Review of the One-Hour Ambient Air Quality Standard for Nitrogen Dioxide, Technical Support Document, December 1992. The ARB evaluation focused on peer-reviewed research published since 1982. In its report, the ARB concluded that, while there are only a few studies that provide information on one-hour exposures to ambient NO_2 at 0.25 ppm, a decline in plant productivity can be detected for exposure for a day or longer to NO_2 in the range of 0.02 to 0.1 ppm. While these effects are associated with a longer exposure duration than the one hour called for in the current standard, there are locations in California where the one-hour standard is approached or exceeded more than one hour per day. It was therefore concluded that the adverse impacts to the most sensitive kinds of vegetation are possible at current air quality levels in parts of California. However, it does not appear that the species found in the Project area or in the JTNP are the most sensitive to this pollutant. In addition, emissions from the Proposed Project will result in ambient NOx levels far below the threshold level for damage identified by Wark and Warner (2.5 ppm or 4700 ug/m^3 for a four-hour exposure). Therefore, no detrimental effects are expected.

Sulfur dioxide pollution is also a potential concern in the area, as SO_2 may damage the leaves of some plants exposed to sufficiently high concentrations and dosage. A threshold does exist because plants exposed to only low concentrations are able to take in small amounts of SO_2 through the stomata and dispose of it without damage. Concentrations above the threshold for a particular plant cause deterioration of the internal cells and leaf discoloration (Fundamentals of Air Pollution, Williamson, 1973).

According to Diagnosing Vegetation Injury Caused by Air Pollution (1976), developed for the EPA by Applied Science Associates, Inc., certain species of plants including pines and other miscellaneous plants such as the common weed (i.e., sow thistle) can be sensitive to SO_2. Information provided by the NPS indicates that, depending on the concentration and presence of other pollutants, SO_2 is also believed to cause visible injuries such as chlorosis (yellowing or loss of leaf color) and necrosis (mortality to leaf tissue) in broadleaf plants and browning of needles in conifer species. A number of biochemical impacts leading to reduced growth, susceptibility to disease and weather stress have also been suggested. A study conducted by the Statewide Air Pollution Research Center at the University of California in Riverside for Southern California Edison looked at the relative sensitivity of desert species to ozone and SO_2. None of the specific species studied were identified in the Eagle Mountain EIR/EIS; however, a variety of species similar to those identified were studied, such as the sage. The study did not list these species as the most sensitive to SO_2 (0.2 ppm). For the purpose of the study, a sensitivity ranking of I (most sensitive) was defined as 0.2 ppm SO_2 required for injury.

Studies conducted also found that the "main detriment of growth effects was average, not peak SO_2 concentrations." Wark and Werner suggest a threshold value of

0.3 ppm (785 ug/m^3) sustained exposure for eight hours, and indicate that concentrations of 0.3 to 0.5 ppm for several days can lead to chronic injury to sensitive plants.

Concentrations in the Southeast Desert Air Basin for 1994 are 3.0 ug/m^3 (0.001 ppm) annual average and 186 ug/m^3 (0.07 ppm) one-hour average measured at the Barstow monitoring station. These concentrations are significantly below the thresholds identified for desert species. The emissions of SO_2 from the Proposed Project will not add significantly to these concentrations and therefore no adverse impacts will result from the Proposed Project.

6.4. Visibility Analysis

A Level-III visibility screening analysis, using PLUVUE-2, was conducted to determine the visibility impacts on JTNP from the Proposed Project.

6.4.1 Optics Calculations

Four types of optics calculations through plumes are generally available in PLUVUE2, in either its plume-based mode or its observer-based mode:

1. horizontal views with a sky background;
2. non-horizontal views with a sky background;
3. horizontal views with white, gray, and black backgrounds; and
4. horizontal views along the plume axis with a sky background.

Since NPS specified the locations of observers and terrain, and since the various default horizontal views with background (type 3, above) in the plume-based mode will have observer-to-terrain distances significantly larger than those that must be considered in the observer-based mode, PLUVUE-2 in its plume-based mode was not used for these runs: only the observer-based mode was used.

Consequently, the following three types of optics calculations available in PLUVUE-2's observer-based mode were carried out for the analysis:

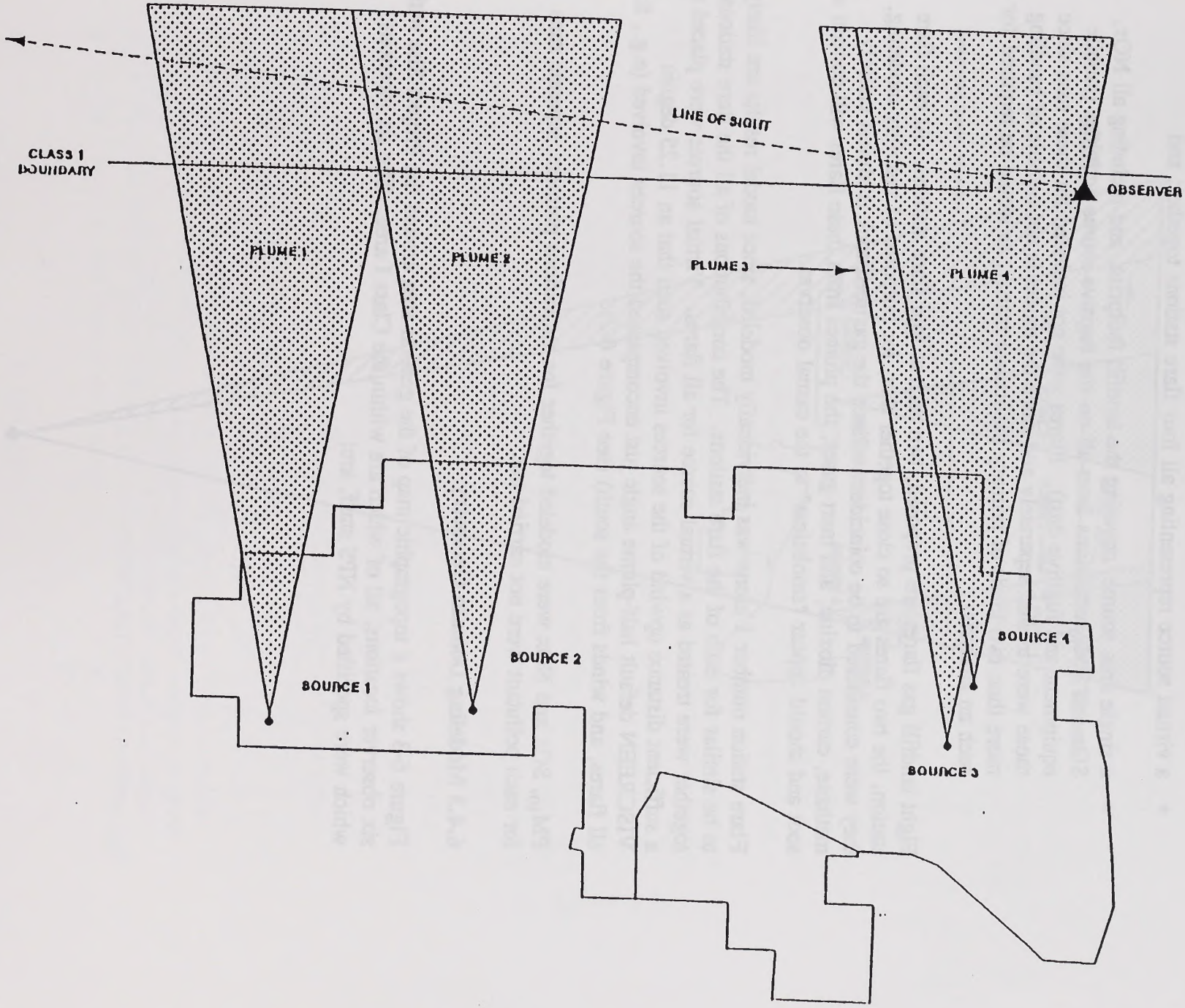
1. horizontal views with a sky background;
2. non-horizontal views with a sky background;
3. horizontal views with white, gray, and black backgrounds.

6.4.2 Site Location and Source Scenarios

A schematic map of the landfill site, showing proposed locations of four landfill flare stations with respect to the landfill property boundary and the JTNP boundary just north of the landfill site, is shown in Figure 6-1. Hypothetical plumes from each flare station are indicated traveling north toward the boundary in Figure 6-1.

Figure 6-1

Flare Station Locations



There were three basic source scenarios that were modeled using PLUVUE-2:

- a single flare station (the first one to be constructed);
- a virtual source representing all four flare stations together; and
- a single area source, covering the landfill footprint, and including all NOx, SOx and PM_{10} emissions from all on-site fugitive source activities (mobile equipment and fugitive dust). Flares were not included for these runs since those were treated separately and since the model is not capable of handling more than two kinds of primary particulate matter, as would be required for such an analysis.

Eight landfill gas flares are proposed, two each at four flare stations. At each flare station, the two flares are so close together that, for purposes of visibility modeling, they were considered to be coincident. Since the gas feedstock is almost entirely methane, carbon dioxide, and inert gases, the plumes from these flares will contain no soot and should appear "smokeless" to the casual observer.

Flare station number 1 alone was individually modeled, since model results are likely to be similar for each of the flare stations. The contributions of all the flare stations together were treated as a virtual source for all flares. Virtual sources were placed at a sufficient distance upwind of the sources involved such that an 11.25 degree VISCREEN default half-plume angle just encompassed the sources involved (e.g., for all flares, and winds from the south) (see Figure 6-2).

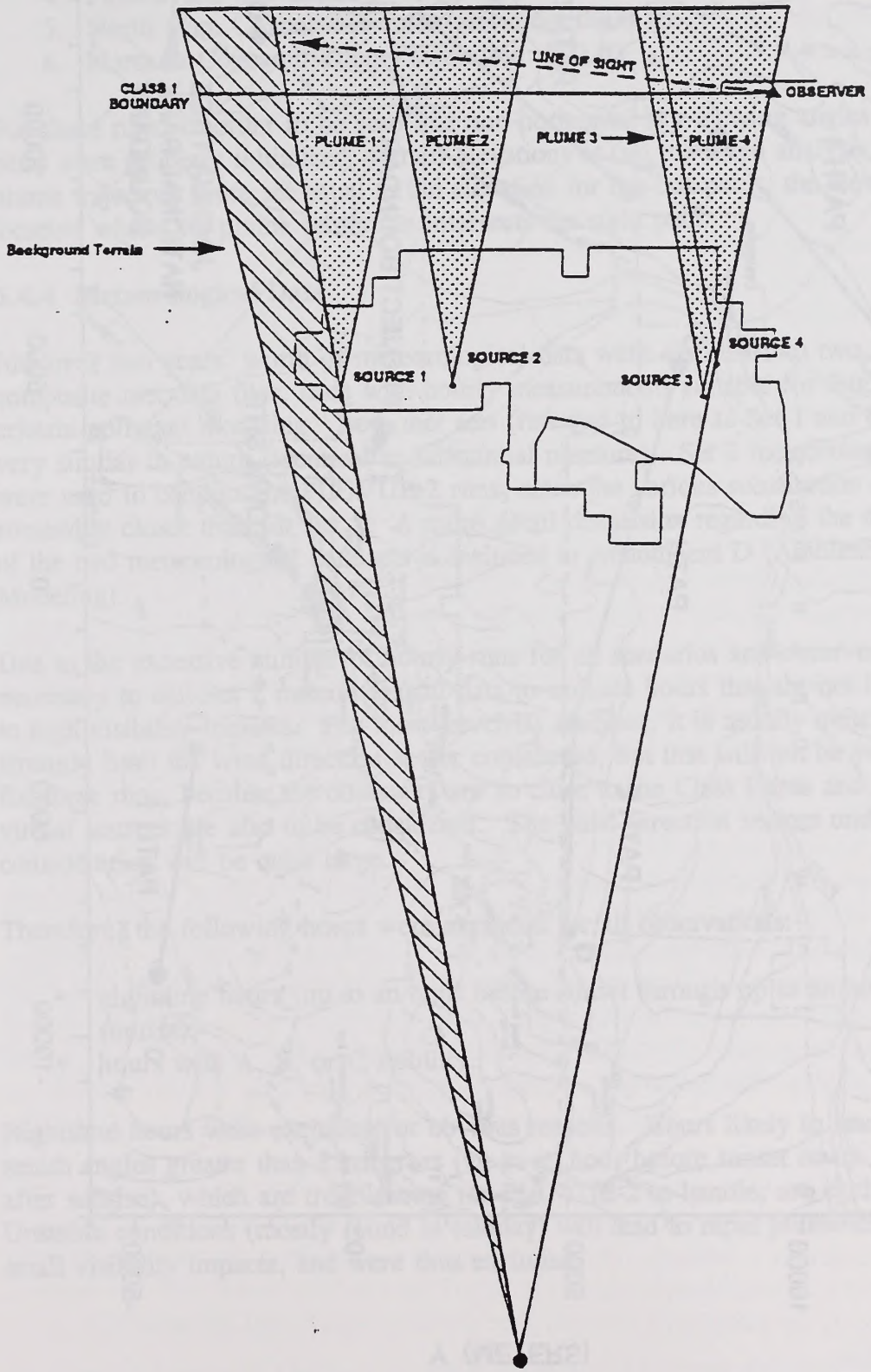
PM_{10}, SOx and NOx were modeled together for the various plumes: separate runs for each pollutant were not carried out.

6.4.3 Modeling Domain Geometry

Figure 6-3 shows a topographic map of the general area around the Project Site with six observer locations, all of which are within the Class I area. The six locations, which were specified by NPS staff, are:

Figure 6-2

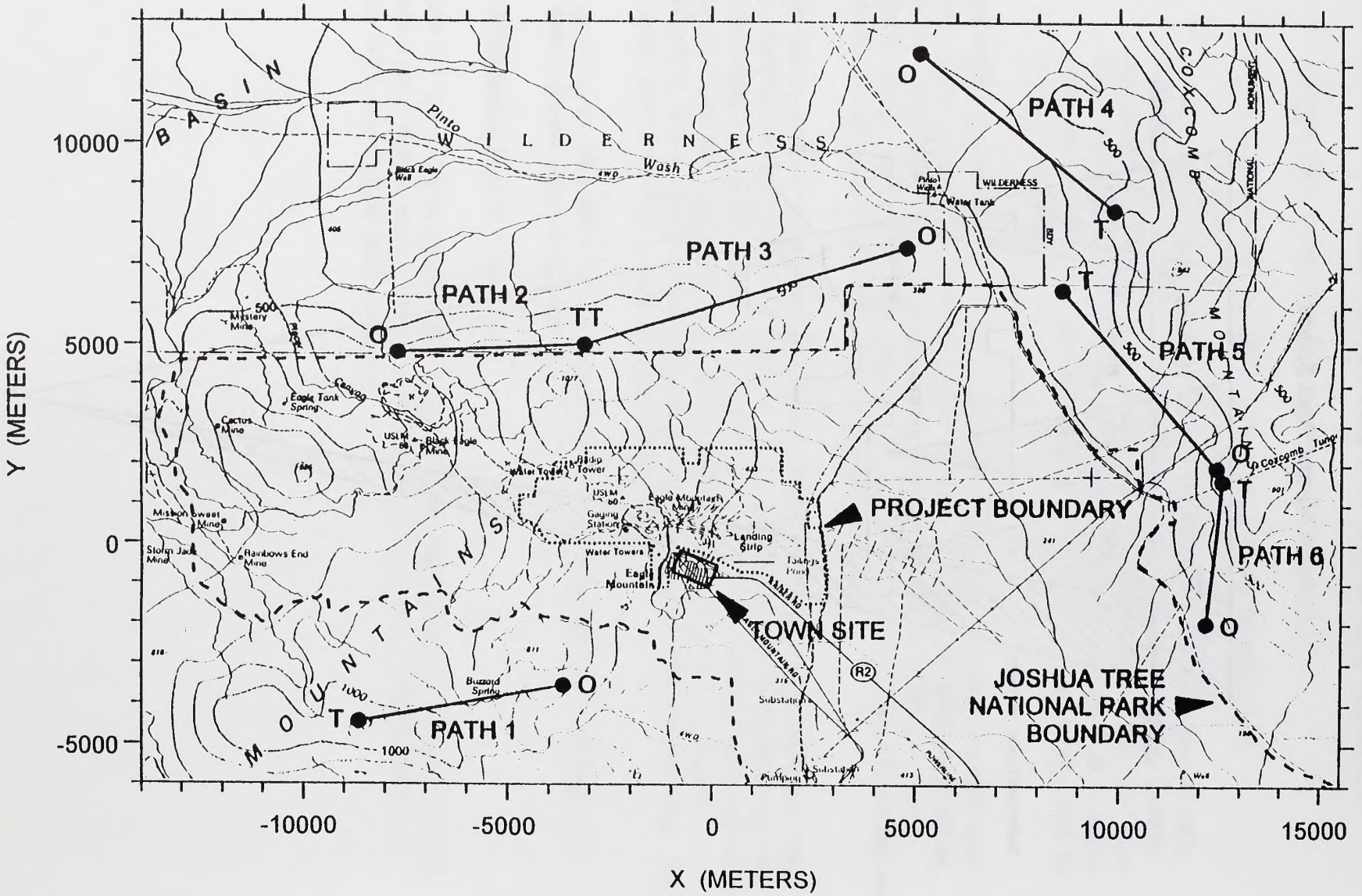
Virtual Point Source



Virtual Point Source (location depends on wind direction)

Figure 6-3

Observer Locations



1. Buzzard Springs to Eagle Mountains (elevation: 2500 ft).
2. South Boundary of Wilderness (elevation: 2439 ft).
3. A second observation point on the south boundary of the wilderness (elevation: 1520 ft).
4. Pinto Wells (elevation: 1400 ft).
5. North from Coxcomb Tunnel (elevation: 2000 ft).
6. North to Coxcomb Tunnel (elevation: 800 ft).

For these runs, in order to be sure that non-horizontal sky viewing angles (known as beta) were properly initialized, terrain elevations at (up to) seven analysis points along plume trajectory were set equal to the elevation for the last point, the elevation for the location where the plume centerline intersects the sight path.

6.4.4 Meteorological Data

Just over two years' worth of meteorological data were distilled into two, year-long, composite met data files, each with hourly measurements suitable for Eagle Mountain criteria pollutant modeling. Both met sets (referred to here as Set 1 and Set 2) were very similar in nature (identical in substantial measure). Set 2 meteorological data were used to conduct the PLUVUE-2 runs, since the various substitution dates are somewhat closer than for Set 1. A more detail discussion regarding the development of the two meteorological data sets is included in Attachment D (Ambient Air Quality Modeling).

Due to the excessive number of hourly runs for all scenarios and observers, it was necessary to edit Set 2 meteorological data to exclude hours that are not likely to lead to high visibility impacts. For most Level-III analyses, it is usually quite effective to strongly limit the wind direction sector considered, but that will not be very effective for these runs, because the observers are so close to the Class I area and because virtual sources are also to be considered. The wind direction sectors under consideration will be quite large.

Therefore, the following hours were excluded for all observations:

- nighttime hours (up to an hour before sunset through up to an hour after sunrise);
- hours with A, B, or C stability.

Nighttime hours were excluded for obvious reasons. Hours likely to lead to solar zenith angles greater than 85 degrees (up to an hour before sunset or up to an hour after sunrise), which are troublesome for PLUVUE-2 to handle, are excluded also. Unstable conditions (mostly found in midday) will lead to rapid plume dispersion and small visibility impacts, and were thus excluded.

6.4.5 Pollutant Characterization

Due to the uncertainty of the nature of the particles produced by the flares and their size distribution, it was necessary to describe a particle size distribution possessing the crucial property indicated by the source test taken at the BKK Landfill in West Covina, CA, in July 1986: 92% of the particles were measured to be below 0.3 micron aerodynamic diameter.

Emission rates for the flares were based upon vendor data provided by John Zink and Company. Emission characteristics for sources other than the flares were developed in a manner consistent with the PLUVUE-2 User's Manual.

6.4.6 Results of Visibility Analysis

Using the approach described above, the analysis of the visibility impacts of the Proposed Project was conducted. Both Delta-E and contrast were used as measures of plume perceptibility. The highest Delta-E results are 6.7 for the unmitigated project and 3.9 for the mitigated project. The highest contrast results are 0.158 and 0.100 for the unmitigated and mitigated project, respectively.

The Delta-E for a plume against a viewing background can be used as an indicator of plume perceptibility and atmospheric discoloration. The User's Manual For The Plume Visibility Model, PLUVUE II, (Revised) 1992, by EPA discusses the criteria for evaluating the model results. The EPA has chosen a Delta-E of 2.0 (corresponding to a contrast of 0.05) as the screening threshold for a Level-1 and Level-2 screening. However, no criteria have been established for Level-3 analysis; this is done on a case-by-case basis. The Level-3 analysis is a more detailed assessment of plume visual impacts to calculate the magnitude of plume visibility impacts for a variety of meteorological conditions with the frequency of occurrence of corresponding conditions to estimate the frequency of occurrence of plume visual impacts. To estimate the frequency distribution for various meteorology conditions and observers, a distribution of Delta-Es and contrasts was used. In the Users Manual For the Plume Visibility Model, PLUVUE II, EPA suggests the range of ΔE between 1 and 4 as the approximate threshold of plume perceptibility. Delta-Es above 4 (contrast of 0.10) were used as values which would be detected as a slight discoloration by most people (probability of 90 percent detection above Delta-E of 4 and high contrast, EPA Workbook For Plume Visual Impact Screening and Analysis, (Revised) 1992). The severity of discoloration would increase with increasing Delta-E.

The highest Delta-E impacts modeled for the single flare runs (total of 720 runs), and for all flares modeled as a virtual source (total of 633 runs), are, respectively, 0.76 and 1.79 (both for Observer 1, winter). The model runs for the gas flares showed that the contrast threshold of 0.05 was barely exceeded (0.0515) for one hour at one observer location. These impacts are sufficiently low that flare visibility impacts will be essentially undetectable.

Since the final plume rise for the flares (120 - 230 m) is so much higher than for fugitive emissions from the project (approximately 30 m), it is unlikely that visibility impacts from both kinds of sources will combine to further degrade visibility for horizontal viewing angles. If non-horizontal viewing angles are considered, and the observer is presumed to be gazing from below up through the fugitive source plume, the considerable increase above 2.0 of the Delta-E screening threshold for the perceptibility of objects with large subtended viewing angles* will virtually ensure that the broad fugitive source plume will contribute very little to combined flare/fugitive source visibility impacts. Thus, combined visibility impacts are likely to remain small, whatever the viewing angle.

Table 6-4 presents the results of the modeling analysis for the Proposed Project without mitigation. Table 6-4 shows that the maximum number of observations above a Delta-E of 4.0 was 30 and a contrast of 0.10 was 12 for worst impacted observer. This represents a maximum of potential observable conditions for only 0.34 percent and 0.14% for Delta-E and contrast, respectively, of the total hours per year. The maximum number of observations with a Delta-E of over 2.0 was 89 for the worst impacted observer. This represents a maximum potential observable condition for only 1 percent of the total hours per year. The maximum number of observations with a contrast greater than 0.05 was 58 for the worst impacted observer. This represents less than 1 percent of the total hours per year.

Table 6-5 shows the results of the modeling analysis for the Proposed Project with mitigation. Table 6-5 shows that there were no observations above a Delta-E above 4.0 or above a contrast above 0.10. For the mitigated project, the maximum number of observations with a Delta-E of more than 2.0 was 39 for the worst impacted observer. This represents a maximum of potential observable conditions for only 0.45 percent of the total hours per year. The maximum number of observations with a contrast greater than 0.05 was 29 for the worst impacted observer. This represents only 0.33 percent of the total hours per year.

Based on these results, it is possible that plume perceptibility and atmospheric discoloration could be detected on occasion by the most sensitive observers. However, it should be noted that all the observer and target locations chosen by NPS for the visibility analyses, being rather close to the project, are also far from the heavily-visited areas of JTNP and will see little traffic. Observer 2, the closest observer or target to the heavily-visited areas of JTNP, is 14 km from Mission Well, the closest location on a heavily-traveled route within JTNP. In addition, Observer location 1 is in difficult terrain and will be rarely visited.

---

* Figure A-2, page 11, Workbook for Plume Visual Impact Screening and Analysis (Revised), EPA-454/R-92-023, October 1992.

Table 6-4
Eagle Mountain Landfill and Recycling Center
Visibility Impacts of Proposed Project Without Mitigation

Observer	Total No. Observ. Delta-E/ Contrast	Max Delta E/ Contrast[1]	Delta-E > 4.0/ Contrast >0.10[1]		Delta-E 2.0 to 4.0/ Contrast 0.05 to 0.10[1]		Delta-E >2.0/ Contr. > 0.05[1]
			No.	% of Year	No.	% of Year	% of Year
1-Summer	24	3.4/0.049	0/0		13/0		
1-Winter	24	6.7/0.158	5/4		9/5		
1-Total	52	6.7/0.158	5/4	0.06%/0.05%	22/5	0.25%/0.06%	0.31%/0.01%
2-Summer	25	6.2/0.105	8/1		3/10		
2-Winter	47	6.4/0.131	22/11		10/19		
2-Total	72	6.4/0.131	30/12	0.34%/0.14%	13/29	0.15%/0.33%	0.49%/0.47%
3-Summer	174	4.5/0.089	3/0		26/8		
3-Winter	124	5.9/0.120	25/10		35/40		
3-Total	298	5.9/0.120	28/10	0.32%/0.11%	61/48	0.70%/0.55%	1.02%/0.66%
4-Summer	44	1.7/0.031	0/0		0/0		
4-Winter	49	3.0/0.067	0/0		6/4		
4-Total	93	3.0/0.067	0/0	0.00%/0.00%	6/3	0.07%/0.03%	0.07%/0.03%
5-Summer	23	3.3/0.062	0/0		1/1		
5-Winter	50	3.4/0.078	0/0		6/4		
5-Total	73	3.4/0.078	0/0	0.00%/0.00%	7/5	0.08%/0.06%	0.08%/0.06%
6-Summer	18	0.9/0.016	0/0		0/0		
6-Winter	36	2.7/0.051	0/0		2/1		
6-Total	54	2.7/0.051	0/0	0.00%/0.00%	2/1	0.02%/0.01%	0.02%/0.01%

[1] Contrast values are absolute values (numerical value of a number irrespective of sign)

Table 6-5
Eagle Mountain Landfill and Recycling Center
Visibility Impacts of Proposed Project With Mitigation

Observer	Total No. Observ. Delta-E/ Contrast	Max Delta-E/ Contrast[1]	Delta-E > 4.0/ Contrast > 0.10[1]		Delta-E 2.0 to 4.0/ Contrast 0.05 to 0.10[1]		Delta-E >2.0/ Contr. > 0.05[1]
			No.	% of Year	No.	% of Year	% of Year
1-Summer	28	1.7/0.028	0/0		0/0		
1-Winter	24	3.9/0.100	0/0		5/4		
1-Total	52	3.9/0.100	0/0	0.00%/0.00%	5/4	0.06%/0.05%	0.06%/0.05%
2-Summer	25	3.5/0.063	0/0		8/8		
2-Winter	47	3.7/0.083	0/0		24/19		
2-Total	72	3.7/0.083	0/0	0.00%/0.00%	32/27	0.37%/0.31%	0.37%/0.31%
3-Summer	174	2.5/0.056	0/0		5/1		
3-Winter	124	3.3/0.075	0/0		34/28		
3-Total	298	3.3/0.075	0/0	0.00%/0.00%	39/29	0.45%/0.33%	0.45%/0.33%
4-Summer	44	0.7 0.9/0.018	0/0		0/0		
4-Winter	49	1.6/0.041	0/0		0/0		
4-Total	93	1.6/0.041	0/0	0.00%/0.00%	0/0	0.00%/0.00%	0.00%/0.00%
5-Summer	23	1.8/0.037	0/0		0/0		
5-Winter	50	1.9/0.047	0/0		0/0		
5-Total	73	1.9/0.047	0/0	0.00%/0.00%	0/0	0.00%/0.00%	0.00%/0.00%
6-Summer	18	0.5/0.009	0/0		0/0		
6-Winter	36	1.4/0.031	0/0		0/0		
6-Total	54	1.4/0.031	0/0	0.00%/0.00%	0/0	0.00%/0.00%	0.00%/0.00%

[1] Contrast values are absolute values (numerical value of a number irrespective of sign)

The proposed project, including the gas flares, would not create a noticeable change or impact in regional visibility or haze to the casual observer from locations at the closest boundaries of JTNP to the Project Site. This is based upon the results of the visibility modeling which indicate no readings above the threshold of ΔE of 4.0 or contrast value greater than 0.10 for the mitigated project. The proposed project at full operation with mitigation would create a slight discoloration in regional visibility for the most sensitive observer less than 0.5% of the time within four miles of the Project Site. This impact is considered insignificant because: 1) the sensitive observer would need to be in an area of the Park where there are no existing trails or campsites; 2) the observer would have to be at this location for some part of the 39 hours per year (0.45%) that this condition might occur; and 3) the background visual range would have to be at the ten percentile value or better during these 39 hours.

6.4.7 Visibility Impacts of Alternatives

Emissions associated with various alternatives have been analyzed in Part 6 of the Air Quality Impact Section. For the Reduced Volume Alternative, 16,000 tons per day of waste would be transported to the landfill site. The amount of waste hauled by truck would be identical but the rail hauling for this alternative would be approximately 78% of the level assumed for the Proposed Project (i.e., 14,000 tons per day vs. 18,000 tons per day). Consequently, for this proposal, rail emissions would be approximately 22% lower that for the Proposed Project. For the Rail Access Only Alternative, 18,000 tons per day of waste would be transported to the landfill by rail, with truck hauling not included. Because the amount of waste hauled by rail is identical to the level assumed for the Proposed Project, the emissions for rail hauling would be identical to the Proposed Project. Under the Alternative Road Alignment Alternative, emissions and impacts would be the same as other alternatives with the exception that an alternative access road would require slightly longer haul distances for truck hauling. Emissions under the Landfill on Kaiser Land Only Alternative would be lower then those for the Reduced Volume Alternative. To evaluate the visibility impacts for the alternatives to the Proposed Project, the Reduced Volume Alternative was chosen.

Table 6-6 shows the results of the visibility impact analysis for the Reduced Volume Alternative. From Table 6-6, you can see that the number of runs with Delta-Es observed above the 4.0 range and contrast values greater than 0.10 is zero; the maximum Delta-E for any observer is 3.2 and the maximum contrast value is 0.082. The maximum number of runs with Delta-E greater than 2.0 is 29 and contrast value greater than 0.05 is 12 for the worst impacted observer. This represents only 0.33 percent and 0.14 percent for Delta-E and contrast, respectively, of the total hours in the year. However, this range (2.0 to 3.2) represents values that are in the range of the approximate threshold of plume perceptibility. Therefore, it is unlikely that, for this alternative, plume perceptibility and atmospheric discoloration will be detected by even the most sensitive observers.

Table 6-6
Eagle Mountain Landfill and Recycling Center
Visibility Impacts of Reduced Volume Alternative With Mitigation

Observer	Total No. Observ. Delta-E/ Contrast	Max Delta-E/ Contrast[1]	Delta-E > 4.0/ Contrast > 0.10[1]		Delta-E 2.0 to 4.0/ Contrast 0.05 to 0.10[1]		Delta-E >2.0/ Cont. > 0.05[1]
			No.	% of Year	No.	% of Year	% of Year
1-Summer	28	1.3/0.022	0/0		0/0		
1-Winter	24	3.2/0.082	0/0		5/3		
1-Total	52	3.2/0.082	0/0	0.00%/0.00%	5/3	0.06%/0.03%	0.06%/0.03%
2-Summer	25	2.8/0.051	0/0		8/1		
2-Winter	47	3.0/0.067	0/0		21/10		
2-Total	72	3.0/0.067	0/0	0.00%/0.00%	29/11	0.33%/0.13%	0.33%/0.13%
3-Summer	174	2.0/0.046	0/0		0/0		
3-Winter	124	2.7/0.061	0/0		13/12		
3-Total	298	2.7/0.061	0/0	0.00%/0.00%	13/12	0.15%/0.14%	0.15%/0.14%
4-Summer	44	0.7/0.014	0/0		0/0		
4-Winter	49	1.3/0.033	0/0		0/0		
4-Total	93	1.3/0.033	0/0	0.00%/0.00%	0/0	0.00%/0.00%	0.00%/0.00%
5-Summer	23	1.4/0.030	0/0		0/0		
5-Winter	50	1.5/0.038	0/0		0/0		
5-Total	3	1.5/0.038	0/0	0.00%/0.00%	0/0	0.00%/0.00%	0.00%/0.00%
6-Summer	8	0.4/0.008	0/0		0/0		
6-Winter	36	1.1/0.025	0/0		0/0		
6-Total	54	1.1/0.025	0/0	0.00%/0.00%	0/0	0.00%/0.00%	0.00%/0.00%

[1] Contrast values are absolute values (numerical value of a number irrespective of sign)

6.5 Criteria Pollutant Impacts

The following paragraphs describe the approach taken to model the air quality impacts of the Eagle Mountain Landfill and Recycling Center on the Joshua Tree National Park.

6.5.1 Emission Sources Analyzed

The Proposed Project will include a variety of emission sources including both stationary sources, such as landfill gas flares, and mobile equipment, such as haul trucks and heavy equipment. A more detailed discussion of these emissions sources is included in Part 4.

6.5.2 Meteorological Data Base

To perform the criteria pollutant impact analysis, it was necessary to develop an extensive meteorological data base including parameters such as wind speed/direction and stability class. The same meteorological data base discussed above for the visibility analysis was also used for the criteria pollutant impact analysis. A detailed discussion of this meteorological data base is also included in Attachment D.

6.5.3 Choice of Models

As with the regional haze and acid deposition analyses discussed above, the EPA ISCST3 model was used to perform the criteria pollutant impact analysis. A detailed discussion of this model and program control parameters used during the analysis is included in Attachment D.

6.5.4 Receptors

ISCST3 allows the user to define both gridded arrays of modeling receptors and sets of "discrete" receptors. Discrete receptors were used in this analysis to capture impacts on the Joshua Tree National Park (JTNP). The receptors were located along the south and southeastern boundaries of the JTNP with receptor spacing ranging from approximately 100 to 200 meters. The receptors used for the JTNP criteria pollutant impact analysis are shown on Figure 6-4.

6.5.5 Program Control Parameters/Source Characteristics

The ISCST3 model allows a user to select model options and emission source characteristics. A detailed discussion of these modeling options and input requirements are discussed in Attachment D.

6.5.6 Results of Criteria Pollutant Impact Analysis

For the modeling analysis, maximum short- and long-term average ambient impacts for NO_2, PM_{10}, CO, and SO_2 occurred primarily SW of the project, where the project and JTNP boundaries make their closest approach. Some maxima are located ESE of the project, where the prevailing westerly winds will most consistently carry plumes from the project. These maximum impacts are shown in Figure 6-4. The worst-case ambient air quality impacts based on the air quality modeling analysis described in the previous paragraphs are summarized below in Tables 6-7 and 6-8 for the Proposed Project without and with mitigation, respectively. The full length input and

Figure 6-4

Eagle Mountain Landfill and Recycling Center
Maximum Project Impacts on Joshua Tree National Park

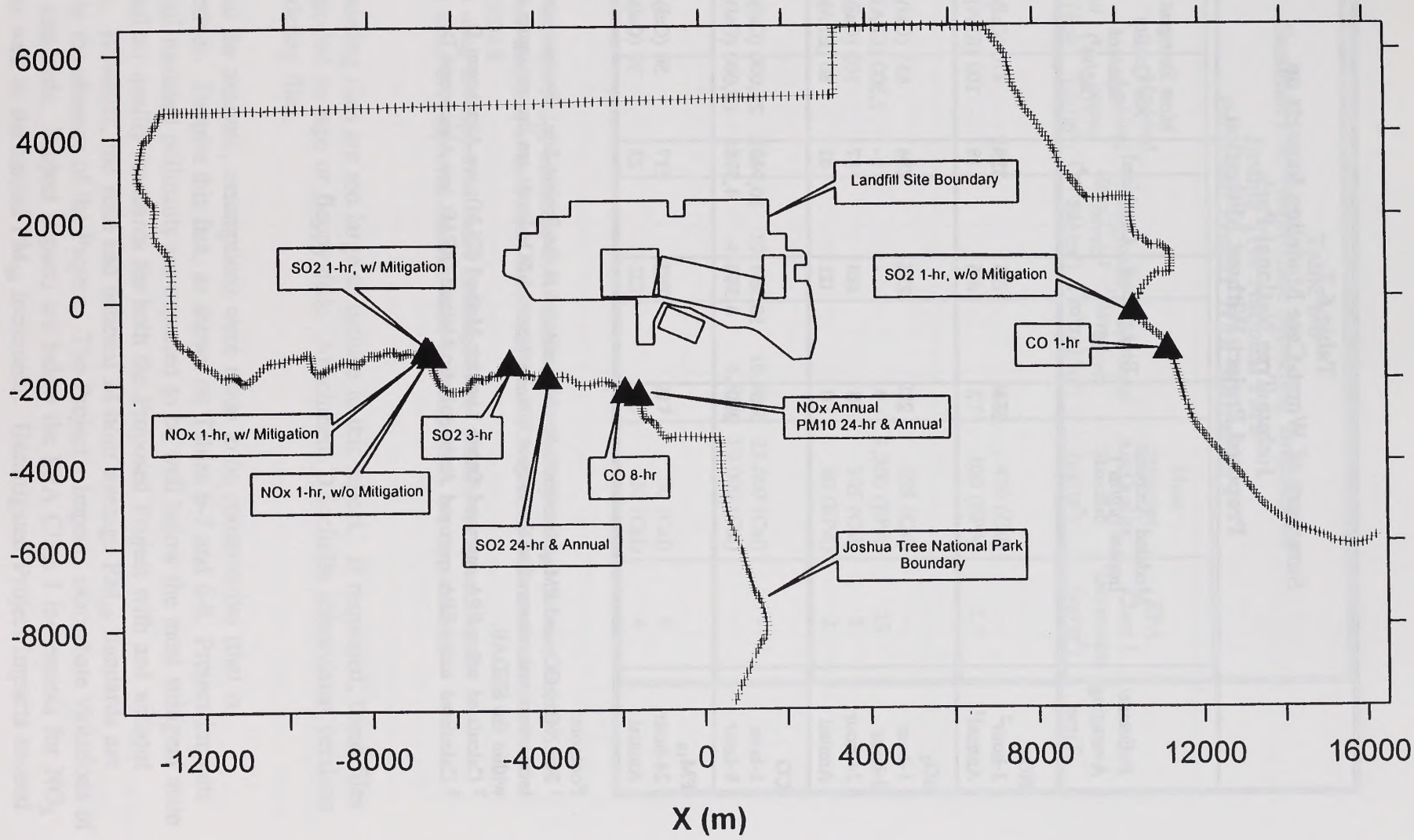


Table 6-7
Summary of Worst-Case Modeling Impacts on
Joshua Tree National Park
Proposed Project Without Mitigation

Pollutant/ Averaging Time	Modeled Ambient Impact ($\mu g/m^3$)	Background Levels[1] ($\mu g/m^3$)	Combined Levels ($\mu g/m^3$)	Most Stringent Air Quality Standard ($\mu g/m^3$)	EPA Class I Increments ($\mu g/m^3$)
NOx					
1-hour[2]	264	75	339	470 (Cal)	-
Annual[3]	2	6	8	100 (EPA)	2.5
SO_2					
1-hour	21	213	234	655 (Cal)	-
3-hour	9	-	-	1,300 (EPA)	25
24-hour	3	34	37	105 (Cal)	5
Annual	0	11	11	80 (EPA)	2
CO					
1-hour	595	10,354	10,949	23,000 (Cal)	-
8-hour	270	4,304	4,574	10,000 (Cal)	-
PM_{10}					
24-hour	7	210	217	50 (Cal)	8
Annual	1	22	23	30 (Cal)	4

Footnote:
[1] For NOx, CO, and PM_{10}, maximum levels monitored at the Project Site. Because ambient SOx levels were not measured at the Project Site, background SOx levels are the maximum monitored within the SEDAB.
[2] Calculated using EPA approved Ozone Limiting Method (OLM), see Attachment D.
[3] Calculated using EPA approved Ambient Ratio Method (ARM), see Attachment D.

Table 6-8
Summary of Worst-Case Modeling Impacts on
Joshua Tree National Park
Proposed Project With Mitigation

Pollutant/ Averaging Time	Modeled Ambient Impact ($\mu g/m^3$)	Background Levels[1] ($\mu g/m^3$)	Combined Levels ($\mu g/m^3$)	Most Stringent Air Quality Standard ($\mu g/m^3$)	EPA Class I Increments ($\mu g/m^3$)
NOx					
1-hour[2]	242	75	317	470 (Cal)	-
Annual[3]	1	6	7	100 (EPA)	2.5
SO_2					
1-hour	19	213	232	655 (Cal)	-
3-hour	9	-	-	1,300 (EPA)	25
24-hour	3	34	37	105 (Cal)	5
Annual	0	11	11	80 (EPA)	2
CO					
1-hour	586	10,354	10,940	23,000 (Cal)	-
8-hour	270	4,304	4,574	10,000 (Cal)	-
PM_{10}					
24-hour	7	210	217	50 (Cal)	8
Annual	1	22	23	30 (Cal)	4

Footnote:
[1] For NOx, CO, and PM_{10}, maximum levels monitored at the Project Site. Because ambient SOx levels were not measured at the Project Site, background SOx levels are the maximum monitored within the SEDAB.
[2] Calculated using EPA approved Ozone Limiting Method (OLM), see Attachment D.
[3] Calculated using EPA approved Ambient Ratio Method (ARM), see Attachment D.

output modeling files are too large to include in this report. If requested, these files will be supplied on tape or floppy disk. Attachment D includes abbreviated versions of the modeling files.

Throughout the analysis, assumptions were made to be conservative (that is, overpredictive). Despite this fact, as shown on Tables 6-7 and 6-8, Project impacts alone for all modeled pollutants are expected to be well below the most stringent state and national air quality standards for both the Proposed Project with and without mitigation. However, the state and national 24-hour average PM_{10} standards are exceeded in the absence of the Project. The Project's impacts exacerbate violations of the PM_{10} standards. Project impacts are below the EPA Class 1 increments for NO_2 and SO_2 as well as the annual PM_{10} increment. Unmitigated Project impacts exceed

the 24-hour average PM_{10} EPA Class 1 increment; mitigated Project impacts do not exceed any Class I increments.

Table 6-9 shows the impacts of the Reduced Volume Alternative with mitigation.

Table 6-9
Summary of Worst-Case Modeling Impacts on
Joshua Tree National Park
Reduced Volume Alternative With Mitigation

Pollutant/ Averaging Time	Modeled Ambient Impact ($\mu g/m^3$)	Background Levels[1] ($\mu g/m^3$)	Combined Levels ($\mu g/m^3$)	Most Stringent Air Quality Standard ($\mu g/m^3$)	EPA Class I Increments ($\mu g/m^3$)
NOx					
1-hour[2]	191	75	266	470 (Cal)	-
Annual[3]	1	6	7	100 (EPA)	2.5
SO_2					
1-hour	15	213	228	655 (Cal)	-
3-hour	7	-	-	1,300 (EPA)	25
24-hour	2	34	36	105 (Cal)	5
Annual	0	11	11	80 (EPA)	2
CO					
1-hour	498	10,354	10,852	23,000 (Cal)	-
8-hour	229	4,304	4,533	10,000 (Cal)	-
PM_{10}					
24-hour	5	210	215	50 (Cal)	8
Annual	1	22	23	30 (Cal)	4

Footnote:
[1] For NOx, CO, and PM_{10}, maximum levels monitored at the Project Site. Because ambient SOx levels were not measured at the Project Site, background SOx levels are the maximum monitored within the SEDAB.
[2] Calculated using EPA approved Ozone Limiting Method (OLM), see Attachment D.
[3] Calculated using EPA approved Ambient Ratio Method (ARM), see Attachment D.

PART 7
COMPARISON OF ALTERNATIVES

7.1 Introduction

To compare the Proposed Project with each of the project alternatives, it was necessary to divide the total emissions for each alternative into the various air basins impacted by the projects. The following paragraphs discuss the approach used to divide emissions per air basin and compare the corresponding emissions per air basin.

7.2 Rail Emissions

For the emission analyses shown in Parts 5 and 6 of the air quality impact section, rail emissions were computed assuming all of the waste haul by rail using a route from Los Angeles to Eagle Mountain. This route was chosen as a "worst-case" approximation of the total rail emissions which will come from a variety of regions. Most of the actual rail haul distances will be shorter than this worst-case assumption. The following paragraphs discuss the approach used to redistribute the "worst-case" total rail emissions used in Parts 5 and 6 into the various air basins impacted by the Proposed Project and project alternatives.

Rail emissions for the main route from Los Angeles to Eagle Mountain were divided into air basins based on the route segments used for analyzing the rail fuel requirements. The route segment between Los Angeles and Beaumont Summit was assigned to the South Coast Air Basin (SCAB). The remainder of the route was assigned to the Southeast Desert Air Basin (SEDAB). On the following figures showing emission impacts, the impacts on the SEDAB are divided between impacts that occur at the Project Site (i.e., Eagle Mountain) and impacts that occur in the remainder of Riverside County (i.e., Riverside County (Offsite)).

Because some portions of waste may come from San Diego, Santa Barbara, and Ventura Counties, it was necessary to estimate the emissions for the San Diego and South Central Coast Air Basins. This was done by a separate analysis, computing the emissions for the route from San Diego to San Clemente for the San Diego Air Basin (SDAB) and for the route from Santa Barbara to Chatsworth for the South Central Coast Air Basin (SCCAB). The fuel use for these routes was taken from a Southern Pacific simulation of MSW trains in similar terrain. As noted in Section 3 of the Eagle Mountain EIR/EIS, Santa Barbara County could have a shortfall of 600 tons/day in disposal capacity by the year 2000. This 600 tons/day level was used for the trash hauled from the SCCAB. Due to a lack of available data for San Diego disposal needs, a level of 1,000 tons/day was assumed for the SDAB estimates provided here. Detailed emission calculations are included in Attachment A.

7.3 Transfer Truck Emissions

With the exception of the No Project alternative which impacts only the SCAB, SDAB, and SCCAB, the transfer truck emissions for the Proposed Project and each project alternative will primarily impact the SEDAB. In computing the transfer truck emissions for the Proposed Project and all project alternatives, transfer trucks were all assumed to travel only within Riverside County. Fifty trucks were assumed to make a 150 mile round trip from the eastern portion of the county and an additional 50 trucks were assumed to make a 300 mile round trip from the western portion of the county. This gives a total of 100 trucks per day with an average round trip of 225 miles. All these emissions were assigned to the SEDAB. In computing the impacts on the Coachella Valley, the trucks from the western portion of the county were assumed to have all their impacts in the Coachella Valley, and the trucks from the eastern portion of the county were assumed to have no impact there.

In computing the truck emissions for the No Project Alternative, transfer trucks were assumed to travel only within the SCAB. There would be additional truck travel required in the San Diego and South Central Coast Air Basins to handle the waste that would otherwise go to the Eagle Mountain Landfill. However, these emissions were not estimated here.

7.4 Emission Comparison

Figures 7-1 to 7-5 compare the estimated annual emissions for the Proposed Project, as well as all project alternatives for each separate air basin.

With respect to oxides of nitrogen, Figure 7-1 shows that NOx emissions in the South Coast Air Basin (SCAB) would be reduced under all of the alternatives compared with the No Project Alternative since the flare and on-site vehicle emissions associated with the No Project Alternative exceed the rail emissions associated with the Proposed Project and other alternatives. The principal increase in NOx emissions from the Proposed Project and all alternatives, with the exception of the No Project Alternative, comes in the Southeast Desert Air Basin (i.e., Riverside County (Offsite) and the Eagle Mountain area). The Proposed Project as well as all project alternatives will result in relatively minor NOx emission increases in the South Central Coast Air Basin (SCCAB) and the San Diego Air Basin (SDAB) due to rail emissions in these areas. There would also be a corresponding decrease in landfill gas production and flare NOx emissions within these basins due to the transfer of waste away from these basins. However, due to insufficient data, these emission reductions are not quantified in this analysis. As noted in Section 7.3, for the No Project alternative there would be a slight NOx emission increase in these basins due to truck haulage of waste. Due to a lack of available data, these emission increases are not quantified in this analysis.

For carbon monoxide, Figure 7-2 shows that CO emissions, both in total and in the SCAB, would be substantially reduced under all of the alternatives compared with the No Project Alternative, due to the use of new flares (combustion systems) and the use of advanced control devices on the systems proposed for the desert site. CO emissions would increase in Riverside County and the Eagle Mountain area as a result of the Proposed Project and alternatives compared to the No Project Alternative due to the addition of CO-emitting operations such as train, truck, flare, and on-site vehicles. Furthermore, CO emissions in the SCCAB and SDAB would increase slightly due to rail emissions in these areas. As discussed above for NOx emissions, there would be a corresponding decrease in landfill gas production and flare CO emissions within these basins due to the transfer of waste away from these areas. However, due to insufficient data, these emission reductions are not quantified in this analysis. In addition, for the No Project alternative there would be a slight CO emission increase in these basins due to truck haulage of waste. Due to a lack of available data, these emission increases are not quantified in this analysis.

The PM_{10} emissions for the Proposed Project and alternatives are shown in Figure 7-3. The data indicate that each of the alternatives would result in a substantial particulate emission reduction in the SCAB compared with the No Project Alternative. This is due to the relocation of the numerous particulate-emitting landfill operations to the SEDAB. Total particulate emissions are nearly equal between the Proposed Project and the No Project Alternative because of the additional mitigation measures proposed for the desert site. Furthermore, there will be an overall decrease in particulate emissions for some of the project alternatives compared to the No Project Alternative due to a combination of greater controls and lower operating levels. Particulate emissions will increase in the SEDAB and SCCAB due to rail emissions in these areas. As discussed above for other pollutants, there would be a corresponding decrease in landfill gas production and flare particulate emissions within these basins due to the transfer of waste away from these areas. However, due to insufficient data, these emission reductions are not quantified in this analysis. In addition, for the No Project alternative there would be a slight particulate emission increase in these basins due to truck haulage of waste. Due to a lack of available data, these emission increases are not quantified in this analysis.

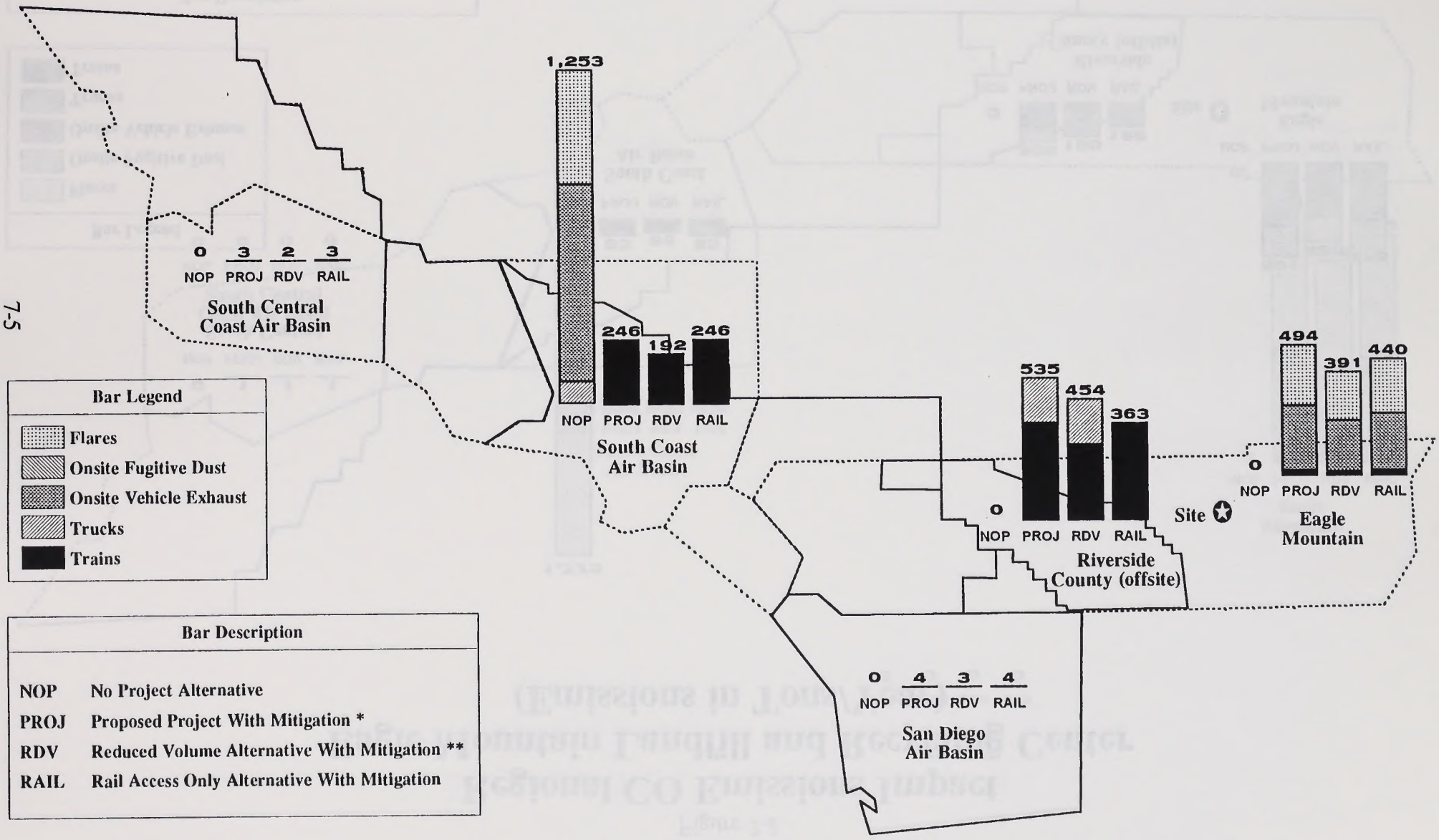
Non-methane hydrocarbon (NMHC) emissions data are presented in Figure 7-4. The results here are similar to those described above for particulates. The Proposed Project and project alternatives result in a substantial reduction of NMHC emissions in the SCAB as compared with the No Project Alternative. This is due largely to the relocation of flare gas emissions to the desert site. The NMHC emissions are increased in the SEDAB (i.e., Riverside County/Eagle Mountain area), SCCAB, and SDAB. As discussed above, there would be a corresponding decrease in landfill gas production and flare/fugitive landfill gas NMHC emissions within these basins due to the transfer of waste away from these areas. However, due to insufficient data, these emission reductions are not quantified in this analysis. In addition, for the No Project alternative there would be a slight NMHC emission increase in these basins, due to

truck haulage of waste. Due to a lack of available data, these emission increases are not quantified in this analysis.

Finally, SOx emissions in the SCAB would be lower under each of the alternatives when compared with the No Project Alternative, as shown in Figure 7-5. This is due to a balance between increased SOx emissions from waste transportation, and decreased SOx emissions associated with the relocation of waste handling operations from the SCAB landfills to the Eagle Mountain site. As with the other pollutants, the SOx emissions are increased in the SEDAB, SCCAB, and SDAB due to rail transport in these areas. As discussed above for other pollutants, there would be a corresponding decrease in landfill gas production and flare SOx emissions within the SCCAB and SDAB due to the transfer of waste away from these areas. However, these emission reductions are not quantified in this analysis. In addition, for the No Project alternative there would be a slight SOx emission increase in these basins, due to truck haulage of waste. Due to a lack of available data, these emission increases are not quantified in this analysis.

Figure 7-1

Regional NOx Emissions Impact
Eagle Mountain Landfill and Recycling Center
(Emissions in Tons/Year)

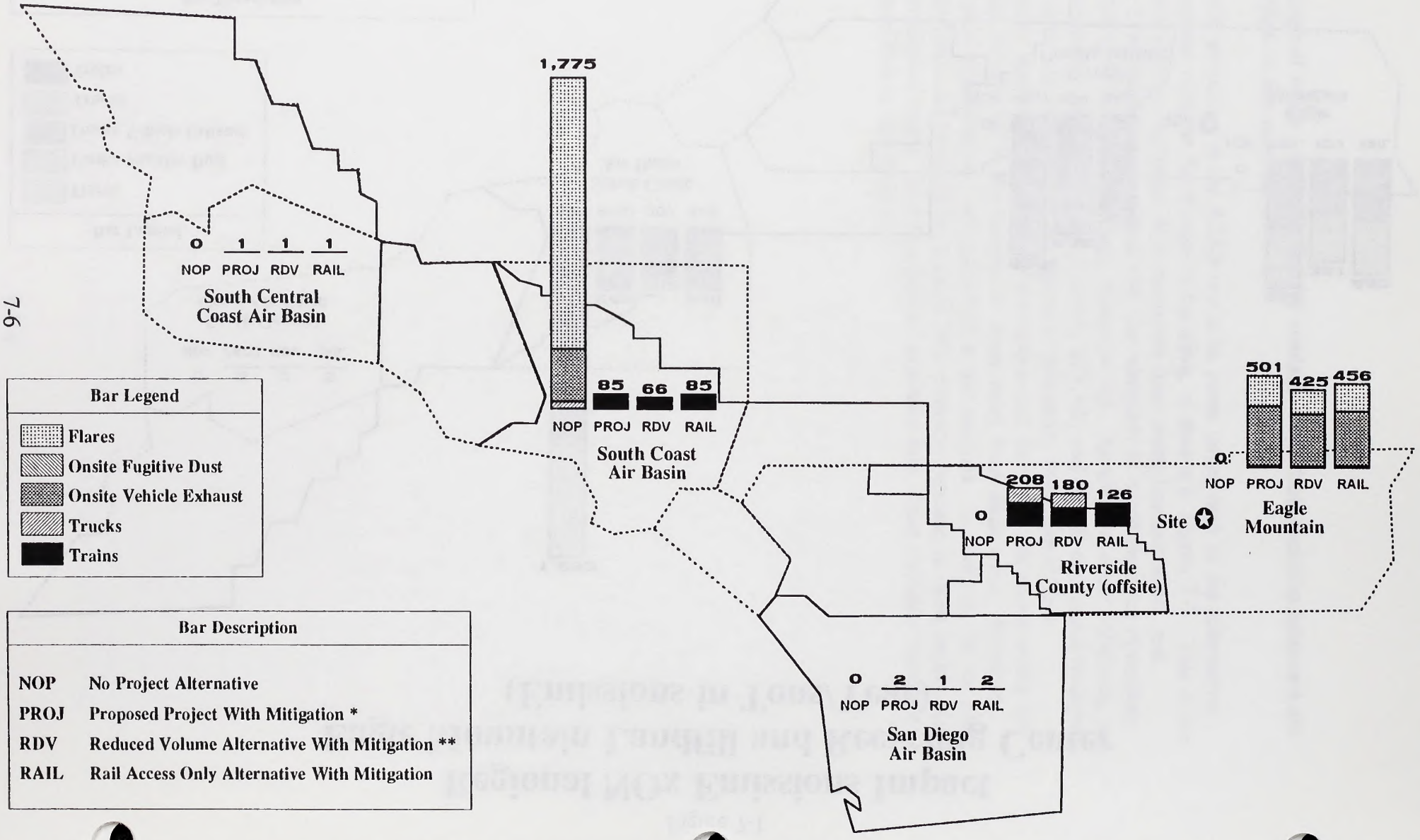


Bar Description	
NOP	No Project Alternative
PROJ	Proposed Project With Mitigation *
RDV	Reduced Volume Alternative With Mitigation **
RAIL	Rail Access Only Alternative With Mitigation

* No Townsite Alternative will have impacts just below these levels while Alternative Road Alignment Allternative will have impacts slightly above these levels.
** Landfill on Kaiser Land Only Alternative will have impacts below these levels.

Figure 7-2

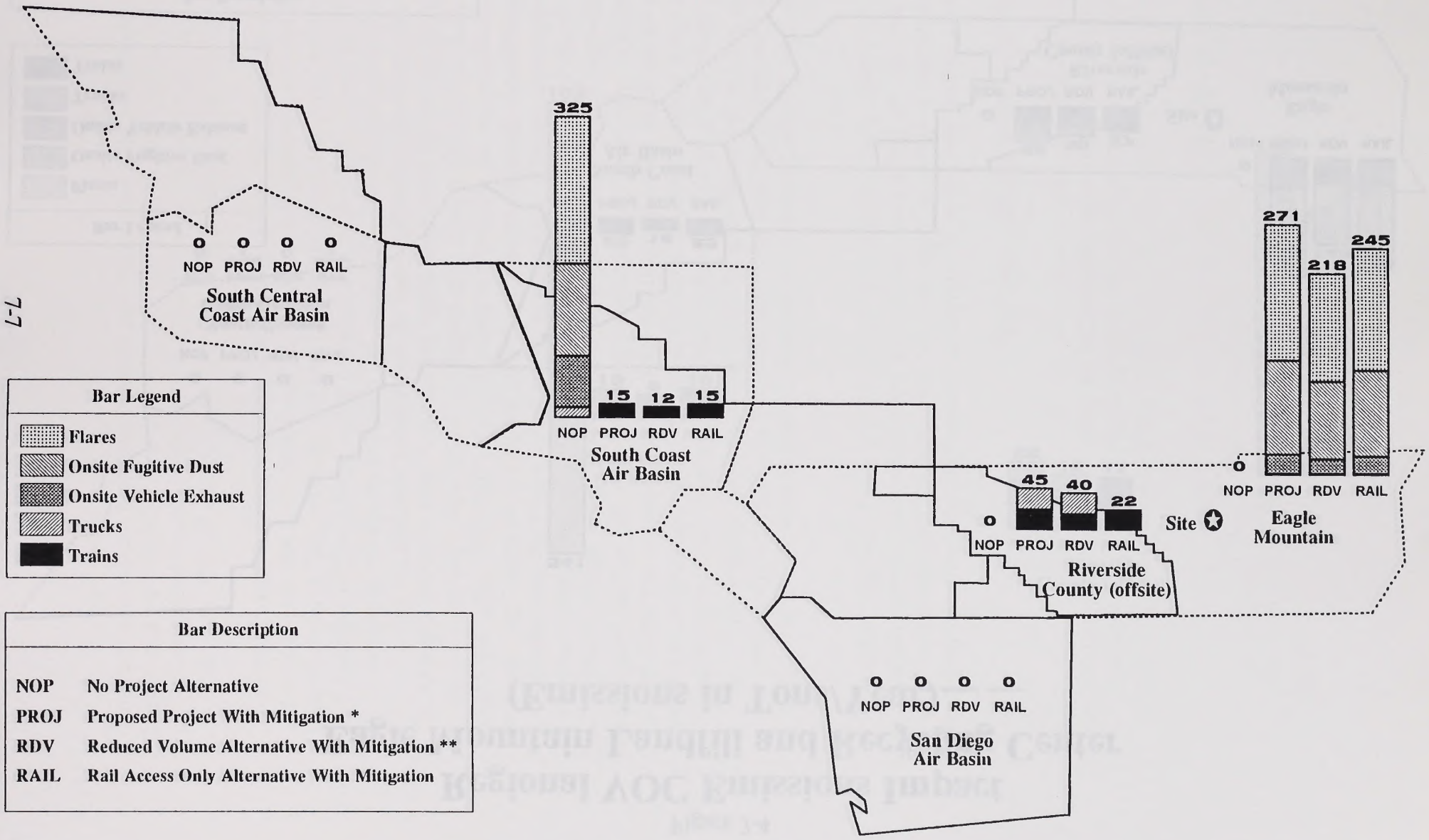
Regional CO Emissions Impact
Eagle Mountain Landfill and Recycling Center
(Emissions in Tons/Year)



* No Tow[illegible] Alternative will have impacts just below these levels while Alternative Ro[illegible]ignment Allternative will have impacts slightly above these levels.
** Landfill on Kaiser Land Only Alternative will have impacts below these levels.

Figure 7-3

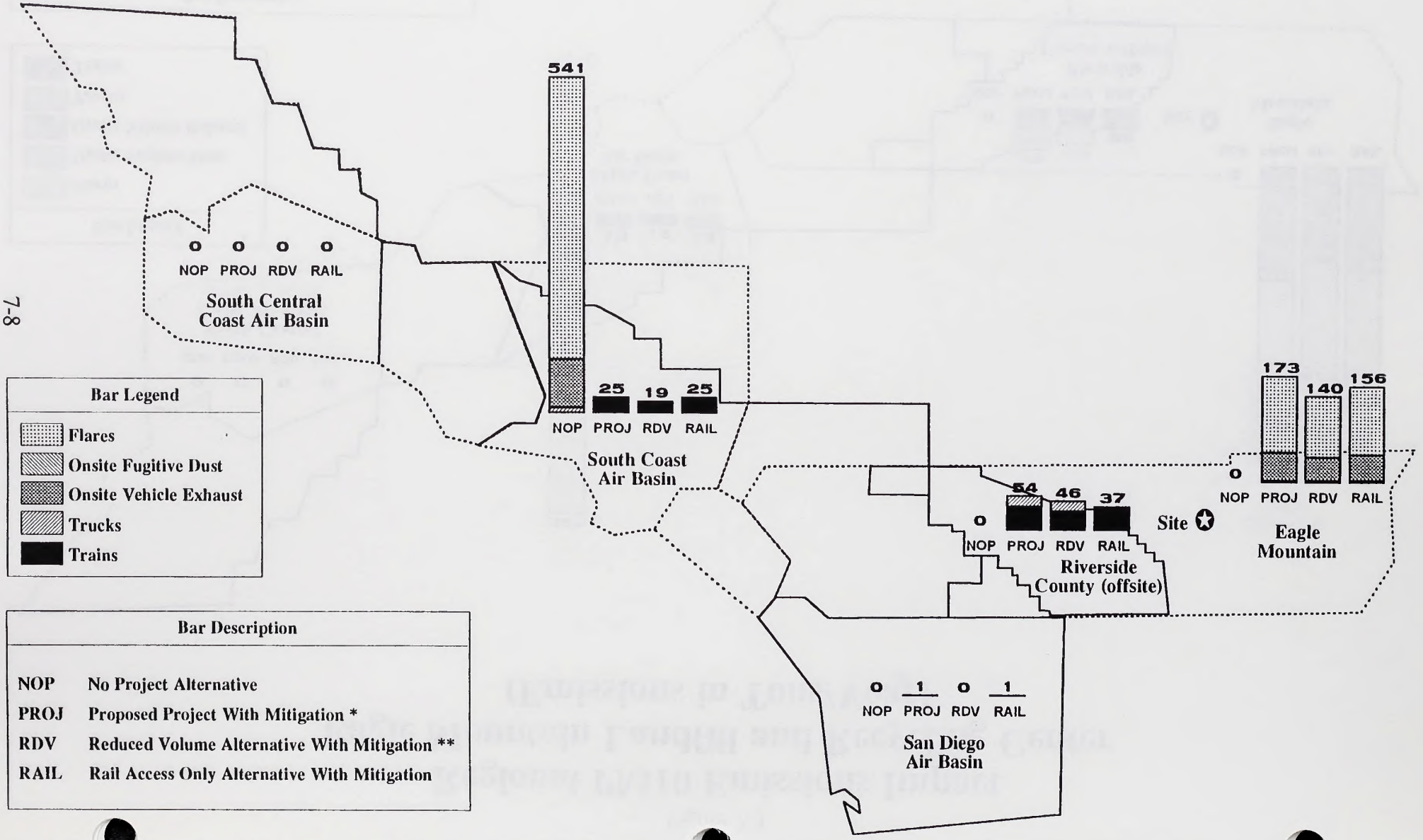
Regional PM10 Emissions Impact
Eagle Mountain Landfill and Recycling Center
(Emissions in Tons/Year)



* No Townsite Alternative will have impacts just below these levels while Alternative Road Alignment Allternative will have impacts slightly above these levels.
** Landfill on Kaiser Land Only Alternative will have impacts below these levels.

Figure 7-4

Regional VOC Emissions Impact
Eagle Mountain Landfill and Recycling Center
(Emissions in Tons/Year)

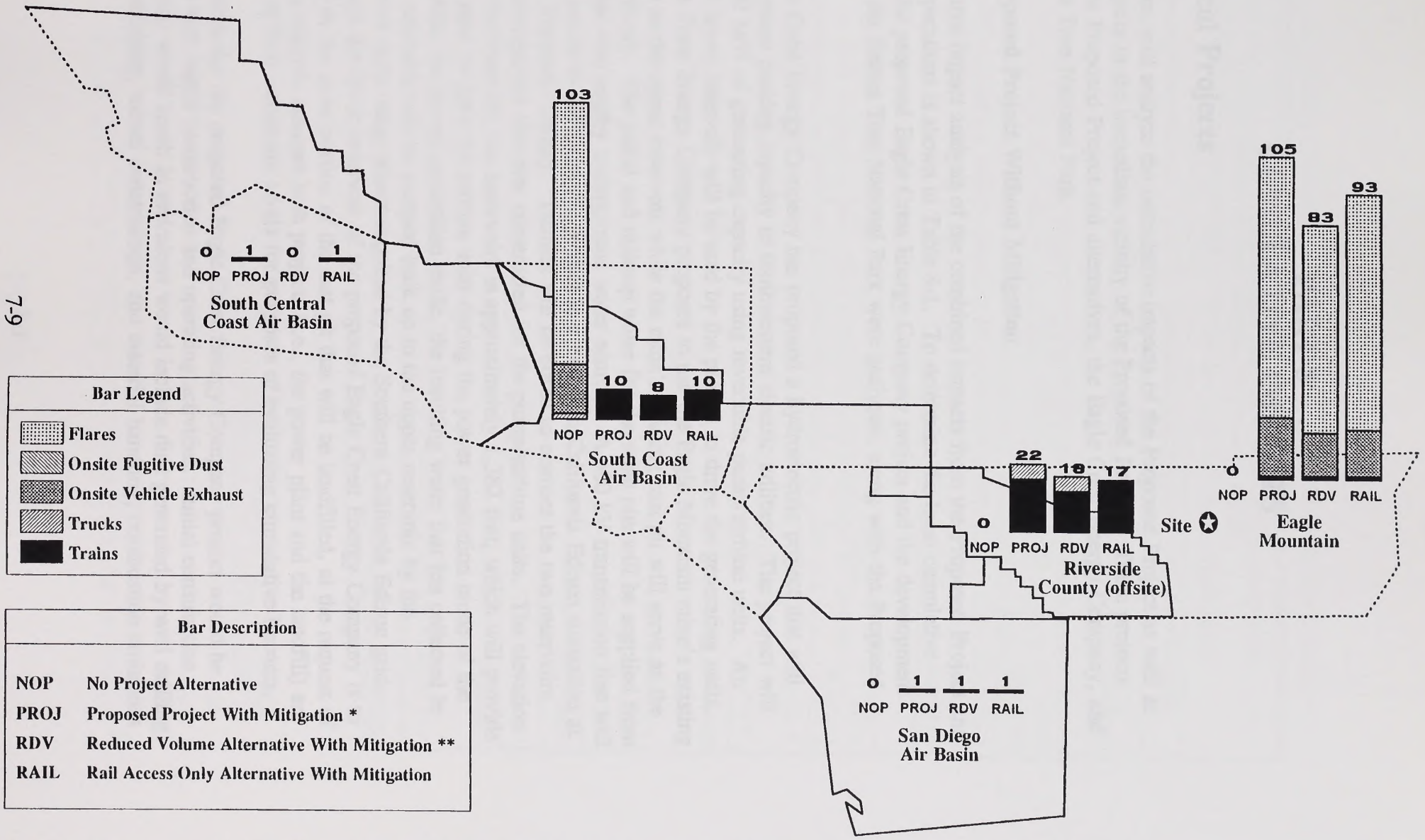


Bar Description	
NOP	No Project Alternative
PROJ	Proposed Project With Mitigation *
RDV	Reduced Volume Alternative With Mitigation **
RAIL	Rail Access Only Alternative With Mitigation

* No Tow[illegible] Alternative will have impacts just below these levels while Alternative Ro[illegible]ignment Allternative will have impacts slightly above these levels.
** Landfill on Kaiser Land Only Alternative will have impacts below these levels.

Figure 7-5

Regional SO2 Emissions Impact
Eagle Mountain Landfill and Recycling Center
(Emissions in Tons/Year)



* No Townsite Alternative will have impacts just below these levels while Alternative Road Alignment Allternative will have impacts slightly above these levels.
** Landfill on Kaiser Land Only Alternative will have impacts below these levels.

PART 8
CUMULATIVE IMPACTS

8.1 Local Projects

This section will analyze the cumulative impacts of the Proposed Project as well as other projects in the immediate vicinity of the Proposed Project. These projects include the Proposed Project and alternatives, the Eagle Crest Energy Company, and the Joshua Tree National Park.

8.1.1 Proposed Project Without Mitigation

A cumulative impact analysis of the combined impacts from the Proposed Project and existing operations is shown in Table 8-1. To determine the local cumulative impacts, the proposed Eagle Crest Energy Company project and the development plans for the Joshua Tree National Park were analyzed, along with the Proposed Project.

The Eagle Crest Energy Company has proposed a hydroelectric project that will provide system peaking capacity to southwestern electric utilities. The project will have 1,000 MW of generating capacity using reversible pump/turbine units. An upper and lower reservoir will be used by the project to drive the generating units. The Eagle Crest Energy Company proposes to use the Eagle Mountain mine's existing central pit as the upper reservoir while the mine's existing east pit will serve as the lower reservoir. The initial and makeup water for the mine pits will be supplied from wells drilled into nearby underground water sources. A 500 kV transmission line will carry the power to and from the project to a Southern California Edison substation at Devers in Riverside County. Tunnels will be bored to connect the two reservoirs with an underground chamber constructed for the pump/turbine units. The elevation difference between the two reservoirs is approximately 1,382 feet, which will provide sufficient head to drive the turbine units during the power generation mode of the project. After the power generation mode, the resulting water that has collected in the lower reservoir will be pumped back up to the upper reservoir by the pump/turbine units using power supplied by the Southern California Edison grid. Even though the lower reservoir of the proposed Eagle Crest Energy Company is to be located in the same portion of the east pit that will be landfilled, at the request of MRC, this analysis assumes both projects (i.e., the power plant and the landfill) are operating at their maximum levels for purposes of evaluating cumulative impacts.

The emissions for the proposed Eagle Crest Energy Company project would be associated with initial construction and operating activities. Initial construction activities that would result in emissions would include dust generated by well drilling, pipeline trenching, tunnel construction, and material handling; combustion emissions

Table 8-1
Eagle Mountain Landfill and Recycling Center
Cumulative Regional Impacts for Proposed Project Without Mitigation

Project	Daily Emissions (lbs/day)					Annual Emissions (tons/yr)				
	NOx	CO	PM_{10}	VOC	SO_2	NOx	CO	PM_{10}	VOC	SO_2
Initial Construction										
Eagle Mountain	3,473	894	1,668	268	80	N/A	N/A	N/A	N/A	N/A
Eagle Crest	211	842	4,957	316	526	N/A	N/A	N/A	N/A	N/A
Combined	3,684	1,736	6,625	584	606	N/A	N/A	N/A	N/A	N/A
Normal Operation - Onsite Emissions										
Eagle Mountain	4,654	2,573	1,554	978	595	849	465	284	178	109
Eagle Crest	3	13	16	5	8	2	1	2	0	0
Joshua Tree[1]	121	1,317	20,245	69	17	14	152	2,336	8	2
Combined	4,778	3,903	21,815	1,052	620	865	618	2,618	186	111
Normal Operation - Total Regional Emissions[2]										
Eagle Mountain	17,355	4,697	1,945	1,599	1,510	3,167	852	355	292	276
Eagle Crest	60,127	10,068	1,042	12,727	131	7,056	1,180	122	1,493	15
Joshua Tree[1]	338	3,492	25,064	173	61	39	403	2,892	20	7
Combined	77,820	18,257	28,051	14,499	1,702	10,262	2,435	3,369	1,805	298

[1] Daily emissions for Joshua Tree Development represent the average daily emissions for emissions in the maximum month of visitation.
[2] For Proposed Project, total regional emissions include train and transfer truck travel outside of the project boundaries as well as onsite emissions. For ECEC, total regional emissions include power plants. For JTNP, total regional emissions include vehicle travel outside of the park.

would include exhaust from Diesel construction equipment and haul trucks. During project operation, dust and combustion emissions would result from utility trucks used for onsite maintenance activities. The major source of emissions during project operation will be associated with generating the power necessary to pump water from the lower to upper reservoir. This power will be generated by power plants located in the southwest. For this analysis, it is assumed that all power requirements will be supplied by existing Southern California power plants. Based on information supplied

by Eagle Crest Energy Company, emissions for the proposed Eagle Crest Energy Company were calculated. When specific operating data was not available from Eagle Crest Energy Company, engineering judgement was used to develop the necessary information.

For the Joshua Tree National Park, the air quality impacts from the Environmental Impact Statement* (EIS) of the Joshua Tree Generalized Management Plan and Development Concept Plans are difficult to evaluate because of the lack of specific data in the EIS. The proposed changes with the potential to create air quality impacts are shown in Figure 8-1. The major source of increased impacts would come from additional visitors and their vehicle operations. The EIS calls for an increase in parking spaces from the current number of 336 cars and 20 RVs in the Lost Horse and Pinto Wye planning units to a proposed value of 716 cars, 71 RVs and 30 traffic control pullouts. Not counting the traffic control pullouts, this is an increase of 380 cars and 31 RVs, more than doubling the current parking. According to the EIS the current roads and parking are inadequate for existing visitors. This has caused visitors to park in areas designated for other attractions. They then walk to the area they want to visit, expanding bald spots at the edges of roadways or creating new trails across the desert which may damage native vegetation. The EIS also calls for a near doubling of the staff positions at the park. However, there are no estimates of the impact of the proposed changes on the number of visitors at the park.

The EIS notes that the number of visitors could increase to three to four million in the next ten to fifteen years, assuming that the past visitor growth rate continues. This can be compared to the 1993 value of 1.3 million visitors. It is not clear how the planned changes will affect the growth rate of visitors. In order to estimate the effect of the project, two separate growth projections were made. Data on the number of visitors from 1980 to 1993 were used to make the projections.** The first projection was similar to the one mentioned in the EIS, namely growth at the historical rate. The growth rate from 1980 to 1992, 6.71% per year, was used for this projection. Using this growth rate, the number of visitors in 2010 was projected to be 3.8 million, an increase of 2.6 million visitors over the number in 1993. A second projection is necessary to determine the number of visitors if the changes in the EIS are not done. The simplest alternative would be to assume no growth and attribute the entire difference of 2.6 million visitors to the proposed park modifications. However, some visitor growth would be expected even if no modifications were made.

---

* U.S. Department of Interior, National Park Service, "General Management Plan, Development Concept Plan, Environmental Impact Statement, Joshua Tree National Monument," Western Regional Office, San Francisco, undated.

** These data were obtained by CH2M Hill. There is a discrepancy in the data presented in the EIS. The plot shown on page 168 of the EIS has a different value for the number of visitors in 1990 than the one presented on page 167. The latter value is consistent with the data from CH2M Hill, and the CH2M Hill data were used in the projections.

Figure 8-1 Proposed Changes at Joshua Tree National Park with Potential Air Quality Impacts	
Area	Changes
Facility-wide	Increase staff from 73.15 full-time equivalents to 144.75
Lost Horse Planning Unit	Add parking for 375 cars and 40 RVs Upgrade Lost Horse Mine Road to two-wheel drive vehicles
Pinto Wye Planning Unit	Upgrade Geology Tour Road for two-wheel drive vehicles Add parking areas at Arch Rock trail head and Wonderland of Rocks pullout
Transition Planning Unit	Build new visitor station Add new interpretive pullouts
Description of Parking Changes at Lost Horse and Pinto Wye Planning Units	Proposed Action provides parking for 716 cars, 71 RVs, and 30 traffic control pullouts. No action alternative has parking for 336 cars and 20 RVs. This is an increase of 380 cars, 51 RVs, and 30 traffic control pullouts.

Consequently, a reduced growth assumption of 2% per year, in the absence of any modifications was made. This assumed growth rate predicts 1.8 million visitors per year in 2010. The difference between the high- and low-growth-rate projections, 2.1 million visitors per year, was assumed to be due to the changes proposed in the EIS.

The main impact of the added visitors would be from the increase in vehicle emissions. These increases were estimated by assuming that the average vehicle contains 2.5 passengers so that the 2.1 million added visitors per year corresponds to an added 0.83 million vehicles per year. The vehicle emissions from these additional visitors are calculated as shown in Attachment A. The largest impact shown in the Attachment A calculations is an increase of 2,336 tons/year of PM_{10} emissions from vehicle travel inside the park. The majority of this was from travel on unpaved roads. This was conservatively estimated as an average of two miles per vehicle entering the park.

Although these PM_{10} emissions are large, they will be located near the main entrances to the park which are approximately 60 miles from the Proposed Project.

Consequently, the emissions from the proposed developments at Joshua Tree National Park are not expected to have a cumulative impact with the emissions from the proposed Eagle Mountain Landfill project. For completeness however, the estimated emissions for the developments at Joshua Tree National Park were included in the combined emissions.

A summary of the emissions associated with the initial construction and operation of the proposed ECEC project and the estimated increase in additional visitors to the Joshua Tree National Park is shown in Table 8-1; detailed emissions calculations are included in Attachment A. The emission estimates in Attachment A show the annual emissions associated with the increase in visitors to the Park. The daily emissions contained in Table 8-2 are the average daily emissions for the month with the highest number of visitors, as reported in the EIS. This table also compares these emissions with the emissions for the proposed Eagle Mountain Landfill and Recycling project without mitigation.

8.1.2 Proposed Project With Mitigation

As discussed above, there is a possibility that the Eagle Crest Energy Company project will be operating simultaneously with the operation of the Proposed Project. In addition, there will be impacts from the proposed development plans for the Joshua Tree National Park. Table 8-2 summarizes the emissions for these projects, with the Proposed Project with mitigation. For purposes of comparison, the emissions for the proposed Eagle Crest Energy Company project and the proposed development of Joshua Tree National Park are the same as the comparison of emissions without mitigation shown in Table 8-1. The detailed emission calculations are included in Attachment A.

8.1.3 Reduced Volume Alternative Without Mitigation

As with the Proposed Project, a cumulative impact analysis was conducted to examine the combined impacts from the Reduced Volume Alternative, the proposed Eagle Crest Energy Company and the development plans for the Joshua Tree National Park. A summary of the emissions associated with the operation of the proposed Eagle Crest Energy Company, the Joshua Tree Nation Park and the emissions for the Reduced Volume Alternative are shown in Table 8-3, with detailed emission calculations included in Attachment A. This table excludes a comparison of construction emissions since these emissions will be the same for the Reduced Volume Alternative as those for the Proposed Project. A comparison between construction emissions for the Proposed Project and the Eagle Crest Energy Company is shown above.

Table 8-2
Eagle Mountain Landfill and Recycling Center
Cumulative Impacts for Proposed Project With Mitigation

Project	Daily Emissions (lbs/day)					Annual Emissions (tons/yr)				
	NOx	CO	PM_{10}	VOC	SO_2	NOx	CO	PM_{10}	VOC	SO_2
Initial Construction										
Eagle Mountain	3,473	894	1,668	268	80	N/A	N/A	N/A	N/A	N/A
Eagle Crest	210	842	1,804	316	526	N/A	N/A	N/A	N/A	N/A
Combined	3,683	1736	3,472	584	606	N/A	N/A	N/A	N/A	N/A
Normal Operation - Onsite Emissions										
Eagle Mountain	2,710	2,771	1,483	948	575	494	501	271	173	105
Eagle Crest	3	13	3	5	8	2	1	0	0	0
Joshua Tree[1]	121	1,317	20,245	69	17	14	152	2,336	8	2
Combined	2,834	4101	21,731	1,022	600	510	654	2,607	181	107
Normal Operation - Total Regional Emissions[2]										
Eagle Mountain	7,027	4,392	1,816	1,384	758	1,282	797	332	252	13
Eagle Crest	60,127	10,068	1,029	12,727	136	7,056	1,180	121	1,493	15
Joshua Tree[1]	338	3,492	25,064	173	61	39	403	2,892	20	7
Combined	67,492	17,952	27,909	14,284	950	8,377	2,380	3,345	1,765	161

[1] Daily emissions for Joshua Tree Development represent the average daily emissions for emissions in the maximum month of visitation.
[2] For Proposed Project, total regional emissions include train and transfer truck travel outside of the project boundaries as well as onsite emissions. For ECEC, total regional emissions include power plants. For JTNP, total regional emissions include vehicle travel outside of the park.

Table 8-3
Eagle Mountain Landfill and Recycling Center
Cumulative Impacts for Reduced Volume Alternative Without Mitigation

Project	Daily Emissions (lbs/day)					Annual Emissions (tons/yr)				
	NOx	CO	PM_{10}	VOC	SO_2	NOx	CO	PM_{10}	VOC	SO_2
Normal Operation - Onsite Emissions										
Eagle Mountain	3,805	2,278	1,259	805	479	694	411	230	147	89
Eagle Crest	3	13	16	5	8	0	1	2	0	0
Joshua Tree[1]	121	1,317	20,245	69	17	14	152	2,336	8	2
Combined Emissions	3,929	3,608	21,520	879	504	710	564	2,568	155	89
Normal Operation - Total Regional Emissions[2]										
Eagle Mountain	13,893	4,031	1,592	1,309	1,197	2,535	731	291	239	219
Eagle Crest	60,127	10,068	1,042	12,727	131	7,056	1,180	122	1,493	15
Joshua Tree[1]	338	3,492	25,064	173	61	39	403	2,892	20	7
Combined Emissions	74,358	17,591	27,698	14,209	1,389	9,630	2,314	3,305	1,752	241

[1] Daily emissions for Joshua Tree Development represent the average daily emissions for emissions in the maximum month of visitation.

[2] For Proposed Project, total regional emissions include train and transfer truck travel outside of the project boundaries as well as onsite emissions. For ECEC, total regional emissions include power plants. For JTNP, total regional emissions include vehicle travel outside of the park.

8.1.4 Reduced Volume Alternative With Mitigation

As with the Reduced Volume Alternative without mitigation, a cumulative impact analysis was conducted to examine the combined impacts from the Reduced Volume Alternative With mitigation, the proposed Eagle Crest Energy Company project and the development plans for the Joshua Tree National Park. A summary of the emissions associated with the operation of the proposed Eagle Crest Energy Company and the emissions for the Reduced Volume Alternative With mitigation are shown in Table 8-4, with detailed emission calculations included in Attachment A. This table excludes a comparison of construction emissions since these emissions will be the same for the Reduced Volume Alternative as those for the Proposed Project. A comparison between construction emissions for the Proposed Project and the Eagle Crest Energy Company is shown above.

8.1.5 Rail Access Only Alternative Without Mitigation

As with the Proposed Project, a cumulative impact analysis looking at combined impacts from the Rail Access Only Alternative, the proposed Eagle Crest Energy Company and the development plans for the Joshua Tree National Park was done. A summary of the emissions associated with the operation of the proposed Eagle Crest Energy Company, the proposed development plans for the Joshua Tree National Park and the emissions for the Rail Access Only Alternative are shown in Table 8-5. The emissions for initial construction for the Rail Access Only Alternative will be the same as for the Proposed Project discussed above. Consequently, Table 8-5 excludes a comparison of construction emissions.

8.1.6 Rail Access Only Alternative With Mitigation

As with the Rail Access Only Alternative without mitigation, a cumulative impact analysis looking at combined impacts from the Rail Access Only Alternative With mitigation and the proposed Eagle Crest Energy Company was done. A summary of the emissions associated with the operation of the proposed Eagle Crest Energy Company and the emissions for the Rail Access Only Alternative are shown in Table 8-6. The emissions for initial construction for the Rail Access Only Alternative will be the same as for the Proposed Project discussed above. Consequently, Table 8-6 excludes a comparison of construction emissions.

8.1.7 Alternate Road Alignment Alternative Without Mitigation

As with the Proposed Project, a cumulative impact analysis looking at combined impacts from the Alternate Road Alignment Alternative, the proposed Eagle Crest Energy Company, and the proposed development plans for the Joshua Tree National Park was done. Because the initial construction and onsite emissions are identical for the Alternate Road Alignment Alternative and the Proposed Project, Table 8-7 only compares the regional emissions associated with the Eagle Crest Energy Company, the

Joshua Tree National Park and the emissions for the Alternate Road Alignment Alternative. Detailed emission calculations are included in Attachment A.

Table 8-4
Eagle Mountain Landfill and Recycling Center
Cumulative Impacts for Reduced Volume Alternative With Mitigation

Project	Daily Emissions (lbs/day)					Annual Emissions (tons/yr)				
	NOx	CO	PM_{10}	VOC	SO_2	NOx	CO	PM_{10}	VOC	SO_2
Normal Operation - Onsite Emissions										
Eagle Mountain	2,143	2,355	8,137	767	455	391	425	218	140	83
Eagle Crest	3	13	3	5	8	2	1	0	0	0
Joshua Tree[1]	121	1,317	20,245	69	17	14	152	2,336	8	2
Combined Emissions	2,267	3,685	21,445	841	480	407	578	2,554	148	85
Normal Operation - Total Regional Emissions[2]										
Eagle Mountain	5,710	3,716	1,484	1,127	603	1,042	673	270	206	110
Eagle Crest	60,127	10,068	1,029	12,727	136	7,056	1,180	121	1,493	15
Joshua Tree[1]	338	3,492	25,064	173	61	39	403	2,892	20	7
Combined Emissions	66,175	17,276	27,577	14,027	800	8,137	2,257	3,283	1,719	132

[1] Daily emissions for Joshua Tree Development represent the average daily emissions for emissions in the maximum month of visitation.
[2] For Proposed Project, total regional emissions include train and transfer truck travel outside of the project boundaries as well as onsite emissions. For ECEC, total regional emissions include power plants. For JTNP, total regional emissions include vehicle travel outside of the park.

Table 8-5
Eagle Mountain Landfill and Recycling Center
Cumulative Impacts for Rail Access Only Alternative Without Mitigation

Project	Daily Emissions (lbs/day)					Annual Emissions (tons/yr)				
	NOx	CO	PM_{10}	VOC	SO_2	NOx	CO	PM_{10}	VOC	SO_2
Normal Operation - Onsite Emissions										
Rail Access Only Alternative	4,240	2,434	1,407	892	540	773	440	257	163	99
Eagle Crest	8	13	14	5	8	2	0	2	0	0
Joshua Tree[1]	121	1,317	20,245	69	17	14	152	2,336	8	2
Combined Emissions	4,364	3,764	21,668	966	565	789	593	2,595	171	101
Normal Operation - Total Regional Emissions[2]										
Eagle Mountain	16,001	4,107	1,671	1,419	1,429	2,980	739	345	259	261
Eagle Crest	60,127	10,068	1,042	12,727	131	7,056	1,180	122	1,493	15
Joshua Tree[1]	338	3,492	25,064	173	61	39	403	2,892	20	7
Combined Emissions	76,466	17,667	27,777	14,571	1,621	10,015	2,328	3,359	1,772	283

[1] Daily emissions for Joshua Tree Development represent the average daily emissions for emissions in the maximum month of visitation.
[2] For Proposed Project, total regional emissions include train and transfer truck travel outside of the project boundaries as well as onsite emissions. For ECEC, total regional emissions include power plants. For JTNP, total regional emissions include vehicle travel outside of the park.

Table 8-6
Eagle Mountain Landfill and Recycling Center
Cumulative Impacts for Rail Access Only Alternative With Mitigation

Project	Daily Emissions (lbs/day)					Annual Emissions (tons/yr)				
	NOx	CO	PM_{10}	VOC	SO_2	NOx	CO	PM_{10}	VOC	SO_2
Normal Operation - Onsite Emissions										
Rail Access Only Alternative	2,414	2,523	1,340	852	512	440	456	245	156	93
Eagle Crest	3	13	3	5	8	2	1	0	0	0
Joshua Tree[1]	121	1,317	20,245	69	17	14	152	2,336	8	2
Combined Emissions	2,538	3,853	21,588	926	537	456	609	2,581	164	95
Normal Operation - Total Regional Emissions[2]										
Eagle Mountain	5,791	3,693	1,546	1,194	669	1,056	670	283	218	122
Eagle Crest	60,127	10,068	1,029	12,727	136	7,056	1,180	121	1,493	15
Joshua Tree[1]	338	3,492	25,064	173	61	39	403	2,892	20	7
Combined Emissions	66,256	17,253	27,639	14,094	866	8,151	2,253	3,296	1,731	144

[1] Daily emissions for Joshua Tree Development represent the average daily emissions for emissions in the maximum month of visitation.

[2] For Proposed Project, total regional emissions include train and transfer truck travel outside of the project boundaries as well as onsite emissions. For ECEC, total regional emissions include power plants. For JTNP, total regional emissions include vehicle travel outside of the park.

Table 8-7
Eagle Mountain Landfill and Recycling Center
Cumulative Impacts for Alternate Road Alignment Alternative Without Mitigation

Project	Daily Emissions (lbs/day)					Annual Emissions (tons/yr)				
	NOx	CO	PM_{10}	VOC	SO_2	NOx	CO	PM_{10}	VOC	SO_2
Normal Operation - Total Regional Emissions[1]										
Eagle Mountain	17,418	4,727	1,954	1,606	1,513	3,178	848	357	293	276
Eagle Crest	60,127	10,068	1,042	12,727	131	7,056	1,180	122	1,493	15
Joshua Tree[2]	338	3,492	25,064	173	61	39	403	2,892	20	7
Combined Emissions	77,883	96,170	28,060	14,506	1,705	10,273	2,431	3,371	1,806	298

[1] For Proposed Project, total regional emissions include train and transfer truck travel outside of the project boundaries as well as onsite emissions. For ECEC, total regional emissions include power plants. For JTNP, total regional emissions include vehicle travel outside of the park.
[2] Daily emissions for Joshua Tree Development represent the average daily emissions for emissions in the maximum month of visitation.

8.1.8 Alternate Road Alignment Alternative With Mitigation

As with the Alternate Road Alignment Alternative without mitigation, a cumulative impact analysis looking at combined impacts from the Alternate Road Alignment Alternative with mitigation, the proposed Eagle Crest Energy Company and the development plans for the Joshua Tree National Park was done. Because the initial construction and onsite emissions are identical for the Alternate Road Alignment Alternative and the Proposed Project, Table 8-8 only compares the regional emissions associated with the Eagle Crest Energy Company, the Joshua Tree National Park and the emissions for the Alternate Road Alignment Alternative. Detailed emission calculations are included in Attachment A. The emission comparison for initial construction and onsite emissions is shown above for the Proposed Project and the Eagle Crest Energy Company.

Table 8-8
Eagle Mountain Landfill and Recycling Center
Cumulative Impacts for Alternate Road Alignment Alternative With Mitigation

Project	Daily Emissions (lbs/day)					Annual Emissions (tons/yr)				
	NOx	CO	PM_{10}	VOC	SO_2	NOx	CO	PM_{10}	VOC	SO_2
Normal Operation - Total Regional Emissions[1]										
Eagle Mountain	7,090	4,422	1,825	1,391	760	1,293	803	334	253	139
Eagle Crest	60,127	10,068	1,029	12,727	136	7,056	1,181	121	1,493	15
Joshua Tree[2]	338	3,492	25,064	173	61	39	403	2,892	20	7
Combined Emissions	67,555	17,982	27,918	14,291	957	8,388	2,387	3,347	1,766	161

[1] For Proposed Project, total regional emissions include train and transfer truck travel outside of the project boundaries as well as onsite emissions. For ECEC, total regional emissions include power plants. For JTNP, total regional emissions include vehicle travel outside of the park.
[2] Daily emissions for Joshua Tree Development represent the average daily emissions for emissions in the maximum month of visitation.

8.1.9 Other Alternatives

For the Landfill on Kaiser Land Only Alternative, the total regional emissions will be even lower than the total regional emissions for the Reduced Volume Alternative. For the No Townsite Alternative, regional emissions will be the same as the Proposed Project with the assumption that the Eagle Mountain Townsite will not be developed

and there will be some additional emissions associated with workers commuting to the site from local communities.

8.2 Proposed Regional Projects

This section addresses the cumulative impact of those foreseeable projects that have the potential to generate environmental impacts that, when addressed collectively with the Proposed Project, could result in cumulative impacts to the environment. The projects chosen are of similar character, could affect similar environmental resources, or are located in geographic proximity to the Proposed Project. There are several additional proposed or pending landfills projects that have similar characteristics as the proposed Eagle Mountain Landfill Project and are located in the geographic limits being used for this analysis. These are;

- Mesquite Regional Landfill-Imperial County
- Rail Cycle-Bolo Station-San Bernardino County
- La Paz County Regional Landfill-La Paz County, Arizona

8.2.1 Mesquite Regional Landfill

The following discussion is derived from the Proposed Mesquite Regional Landfill EIS/EIR.

The proposed Mesquite Regional Landfill is located to the north of State Route 78 in eastern Imperial County. This site is approximately 75 miles southeast of the Eagle Mountain Project site.

As with the Proposed Project, the landfill design includes provisions to collect the majority of the landfill gas (LFG) generated by the proposed landfill to avoid development of explosive air and methane mixtures and to avoid transport of trace organics to the atmosphere and ground water.

The project includes a flare station in the early years and energy recovery in the later years. Differences in the analysis of emissions and impacts are summarized for three different approaches.

1. Turbine/Boiler Based Power Plant

   This approach would utilize a gas turbine or boiler based power plant to generate electricity for the facility. Excess power could be fed into the existing system through the transmission line which currently provides electricity to the Mesquite Mine, and sold.

2. Compressed Methane Gas Plant

   The approach would consist of a compressed methane gas plant to develop commercial quality methane from LFG. This methane would then be piped to an existing natural gas transmission line located near Niland in a potential future gas pipeline that may be constructed with the new rail spur right-of-way and along the existing SP Main Line.

3. Liquefied Methane Gas Plant

   In this approach, a plant would be constructed to convert the methane gas in LFG into liquid methane gas, a portion of which could potentially be used for on-site fuel requirements. Fuel not used at the site would be transported off-site by truck or rail car. It is also possible that other fuels could be made from methane, such as Diesel oil or methanol.

Over the proposed 100-year life of the project, it is possible that each of these energy recovery methods would be utilized by the applicant and that more than one may be in operation at the same time. Therefore, a summary of emissions under each of these approaches is presented. For purposes of impacts, the emissions were calculated for the year of highest emissions which would be the last year of landfilling. To estimate the maximum likely emissions for the Year 100, the generation of electricity by a boiler burning LFG from MSW was assumed. This is a worst-case air emission analysis as compared to the operation of a methane gas plant or a process plant to covert LFG to liquefied methane gas.

Mobile sources were divided into on-site sources and transportation (off-site) sources. On-site equipment includes heavy-construction equipment such as dozers, compactors, tippers, end-dump trucks, water trucks, graders, loaders, fork lifts, container truck tractors, and miscellaneous medium/heavy-duty tow and maintenance trucks. Transportation sources includes trains, highway MSW trucks, and employee (also including supply) vehicles.

Fugitive sources consist primarily of LFG emissions from the surface of the landfill and fugitive dust emissions. Fugitive dust sources include fugitive dust generated by traffic on unpaved roads, heavy-construction equipment moving soil, and wind erosion of soil. Additional emissions could include evaporation of fuel from storage tanks and from the fueling process, which would produce a small amount of reactive organic gases (ROG).

Table 8-9 summarizes estimated on-site project emissions with mitigation at Year 100.

Table 8-9 Estimated Project Site Emissions with Mitigation Proposed Mesquite Regional Landfill (emissions in lbs/day)					
Source	NOx	ROG	PM_{10}	SOx	CO
Stationary Source Boiler/Generator	630	30	10	360	10
Fugitive Sources	0	250	140	0	0
Mobile Sources	1,590	290	50	50	1,320
Total	2,220	570	200	410	1,330

Table 8-10 summarizes the total estimated emissions associated with transport of MSW to the proposed landfill site at the maximum disposal rate with mitigation. This includes all project-related transport emissions.

Table 8-10 MSW Transport-Related Emissions with Mitigation Proposed Mesquite Regional Landfill (emissions in lbs/day)					
Emission Source	NOx	ROG	PM_{10}	SOx	CO
Trucks in SCAB	540	110	60	20	420
Trains in SCAB	2,610	120	80	60	370
LATC	330	30	30	10	140
Total SCAB	3,480	260	170	90	930
Coachella Valley (Trains)	2,680	120	80	60	380
Imperial County (Trains)	1,940	90	60	40	270
Total	8,100	470	310	190	1,580

8.2.2 Rail Cycle - Bolo Station, San Bernardino County

The following discussion is derived from the draft EIR/EIS for the Rail Cycle-Bolo Station Landfill Facility.

The proposed site is located in the Mojave Desert in southeastern San Bernardino County, in between the towns of Cadiz and Amboy. The site is approximately 50 miles north of the Eagle Mountain Project.

The proposed Rail Cycle - Bolo Station project proposes initial operation with a flare system to collect and burn excess landfill gases. After approximately five years, a gas turbine could be used to generate electricity from the landfill gases if sufficient quantities of landfill gas are generated and collected. After approximately 25 years, a steam boiler would be added to generate additional electricity from the landfill gases. At all times, the flare would be used to burn excess landfill gas that cannot be handled by the gas turbine or the boiler. At full capacity, the landfill will accept 21,000 tons per day of MSW. The expected lifetime of the facility is 75 years or more.

The mitigated on-site emission rates for this landfill, at full capacity, are shown in Table 8-11 and the mitigated off-site emission rates, at full capacity, are shown in Table 8-12. The Rail Cycle project will haul clay and gravel from off-site. Thus the off-site emission sources for this project include some emission sources that would be included in the on-site emissions for other landfill projects.

Table 8-11
Estimated Project Site Emissions with Mitigation
Proposed Bolo Station Landfill
(emissions in lbs/day)

Source	NOx	ROG	PM_{10}	SOx	CO
Flare (years 3-5)	23	192	32	6	87
Turbine (years 5-25)	665	67	957	133	950
Boiler (years 25+)	896	996	916	279	100
Miscellaneous and Fugitive Sources	0	1,512	1,874	0	0
On-site Mobile Sources	2,651	360	154	87	3,056
Flare Total (years 3-5)	2,674	2,604	2,060	93	3,143
Turbine Total (years 5-25)	3,316	1,939	2,994	220	4,006
Boiler Total (years 25+)	3,547	2,680	2,944	366	3,165

Note: Only one of the three possible sources (flare, turbine, or boiler) will be in operation at a given time.

Table 8-12
Off-site Transport-Related Emissions with Mitigation
Proposed Bolo Station Regional Landfill
(emissions in lbs/day)

Emission Source	NOx	ROG	PM_{10}	SOx	CO
Locomotives	7,882	307	170	563	1046
Other Vehicles	435	64	70	25	319
Total	8,317	371	240	588	1365

8.2.3 La Paz County Regional Landfill

The La Paz County Regional Landfill project represents a planned 480-acre expansion of an existing 160-acre landfill approximately eighteen miles southeast of Parker, Arizona. Waste would be received via rail shipments on the Arizona & California (A & C) Railroad, which links Phoenix, Arizona and Barstow, California. Waste could be hauled from Los Angeles, leaving the South Coast Air Basin via the Santa Fe tracks over the Cajon Pass. The total capacity of the entire site if fully permitted would be approximately 100,000,000 tons.

In order to consider the effects of the La Paz County Regional Landfill on regional cumulative impacts, it is necessary to assume some distribution of solid waste coming from Southern California. At present, some waste from Southern California is delivered to La Paz by truck. The future MSW waste stream was assumed to be 12,000 tons/day, all of it originating at the same locations as the MSW to be delivered to the Rail Cycle/Bolo Station landfill. With this assumption, the rail emissions between the loading of the MSW onto the train and the arrival at Bolo Station could be taken from the EIR for that project (after scaling by the ratio of the 12,000 tons/day assumed for La Paz to the 21,000 tons/day for Bolo Station.) The rail emissions for the added distance between Bolo Station and La Paz were calculated in the same way as the rail emissions in the San Diego and South Central Coast Air Basins were found. The rail emissions for 12,000 tons/day of MSW from the Los Angeles area to La Paz are compared with other rail emissions in Section 8.3.

8.3 Evaluation of Cumulative Regional Impacts

The MSW projects described above are all potential competitors for the same potential solid waste streams from the Southern California region. Although the individual project emission estimates are somewhat different, the future actual emissions, per ton of solid waste, will be similar for the various projects. This is shown in Table 8-13.

Table 8-13
Comparison of Total Project Emissions (on- and off-site) per Ton of Solid Waste (emissions in lbs/ton of MSW)

Project	NOx	ROG	PM_{10}	SOx	CO
Eagle Mountain	0.4	0.1	0.1	0.1	0.2
Mesquite	0.5	0.1	0.03	0.03	0.2
Bolo Station	0.1	0.2	0.2	0.1	0.2
La Paz	0.4	0.02	0.01	0.03	0.05

Note:
Emissions based on landfill capacity of 20,000 tpd for Eagle Mountain and Mesquite, 21,000 tpd for Bolo Station and 12,000 tpd for La Paz. Bolo Station emissions based on boiler use in years 25 and beyond.

The amount of waste produced is *not* determined by the landfill capacity; it is determined by the amount of waste generated. Hence, a reasonable assumption is that future choices that individual areas in Southern California make about their waste disposal will affect the distribution of waste among the proposed landfill projects, not the total amount of waste handled. Under this assumption, the regional emissions from these projects will be approximately constant regardless of how many projects are built and how the waste is distributed among them. Since the projects are located at sufficient distances to avoid any local interaction of air quality impacts, the cumulative emission impacts are significant only if the emission impacts of any individual project are significant.

The one place where there is an opportunity for the emissions from these various projects to interact is with respect to off-site rail emissions. The emission estimates for these projects have all been based on operation at full capacity. The rail emission estimates for the two projects discussed above are compared to the rail emission estimates for the proposed Eagle Mountain Project in Table 8-14. Both the Eagle Mountain and Mesquite landfills will be served by trains leaving the South Coast Air Basin over the Southern Pacific tracks through Colton and Beaumont Summit. At Ferrum, where the Eagle Mountain MSW will be transferred onto the Eagle Mountain

rail spur, the Mesquite Landfill MSW will continue on the SP tracks. The Rail Cycle - Bolo Station project will be served by Santa Fe trains leaving the South Coast Air Basin over the Cajon Pass. Thus, all three projects will have emissions in both the South Coast Air Basin and the Southeast Desert Air Basin. The emissions in the SCAB will occur over closely located East-West rail corridors. The emissions in the SEDAB will be somewhat separated. The Rail Cycle-Bolo Station rail emissions will be in the northern portion of the SEDAB. The Eagle Mountain Landfill rail emissions will be in the central portion of the SEDAB and the Mesquite Landfill rail emissions will be in the central and southern portions of the SEDAB. However, these emissions are not necessarily additive. As stated above, the amount of waste produced is not determined by the landfill capacity; it is determined by the amount of waste generated. Decisions regarding waste disposal areas will affect the distribution of waste among the proposed landfill projects, not the total amount of waste handled. It is therefore reasonable to assume the regional emissions would be approximately constant regardless of how many projects are built.

Table 8-14
Comparison of Rail Emissions for Various Projects
All Projects are with Mitigation‡

Facility	NOx	ROG	PM_{10}	SO_x	CO
Maximum Daily Emissions in lbs/day					
Eagle Mountain	3,377	342	206	157	1,170
Bolo Station	7, 882	307	170	563	1,046
Mesquite	7,560	2360	250	170	1,160
La Paz	5089	181	38	371	612
Maximum Annual Emissions in tons/year					
Eagle Mountain	616	62	38	29	214
Bolo Station	1,230	48	27	88	163
Mesquite†	1,380	66	46	31	212
La Paz†	929	33	18	68	112

Notes:
‡ Mesquite and Eagle Mountain have daily capacity of 20,000 tons/day of MSW. Bolo Station capacity is 21,000 tons/day. La Paz emissions are for 12,000 tons/day of MSW from the Los Angeles area.
† Annual emissions computed assuming 365 day per year operation.

Attachment A

Detailed Emissions Calculations

Section A-1
MRF/TS Emissions Calculations

MATERIAL RECOVERY FACILITIES

Although Materials Recovery Facilities (MRFs) and Transfer Stations (TSs) are not proposed as part of the Proposed Project, they are discussed here to provide context for the general waste management process, which is pertinent to other regional rail-haul landfills, as well as the Proposed Project. MRFs and TSs will be used to segregate recyclables and hazardous materials, and to compact waste components. Streams destined for recycling may be temporarily stored on-site at a MRF or TS, and periodically shipped to processors. Nonrecyclable waste will be loaded into transfer trailers or shipping containers and shipped from the MRFs and TSs by rail for ultimate disposal at Eagle Mountain. Each MRF/TS will be served directly by a rail spur or be located near one. Containerized waste will be transferred by truck to railheads from those stations not directly served by rail.

Emissions are generated at the MRFs/TSs by the operation of on-site vehicles. Diesel-powered equipment will be used to load segregated waste into compactors, load filled containers onto trucks or rail cars, and spot rail cars for loading. Due to the high moisture and low silt content of waste, the dust emissions associated with waste handling are assumed to be negligible. Where rail sidings are separated from MRFs/TSs, transfer trucks will be used to move containers offsite to railcars. Emissions will be associated with this operation, but due to the lack of available data regarding the truck haul distances between MRFs/TSs and rail sidings, transfer truck emissions are not included in Table A-1-1. A summary of daily emissions for a typical MRF/TS appears in Table A-1-1. The detailed emission calculations are included as Table A-1-2.

Table A-1-1
Emission Summary for a Typical MRF/TS
(lbs/day)

Equipment	NOx	CO	PM_{10}	VOC	SO_2
Loaders	153	79	16	13	3
Container Handler	102	53	11	9	2
Train Car Spotter	13	7	1	1	0
Total	268	138	28	23	5

Table A-1-2

Eagle Mountain Landfill and Recycling Center
Emission Summary for a Typical MRF/TS

Vehicle Type	Number	Hr/Day	Fuel Gal/Hr
Rubber-tired Loader	3	20	7
Container Handler	2	20	7
Train Car Spotter	1	5	7

Emission Factors (lbs/1000 gal)(1)

Vehicle Type	NOx	CO	PM10	VOC	SO2
Rubber-tired Loader	364.76	187.83	37.90	31.31	7.10
Container Handler	364.76	187.83	37.90	31.31	7.10
Train Car Spotter	364.76	187.83	37.90	31.31	7.10

Emissions (lbs/day)

Vehicle Type	NOx	CO	PM10	VOC	SO2
Rubber-tired Loader	153.20	78.89	15.92	13.15	2.98
Container Handler	102.13	52.59	10.61	8.77	1.99
Train Car Spotter	12.77	6.57	1.33	1.10	0.25
Total =	268.10	138.06	27.86	23.01	5.22

(1) Emission factors from EPA's "Non-Road Engine and Vehicle Emission Study Report", 21A-2001, 11/91, with a 25.5% reduction for PM and 9.5% reduction for NOx for using low sulfur fuel.

Section A-2
Eagle Mountain And Recycling Center
Emissions Calculations
Proposed Project Without Mitigation

Table A-2-1

Eagle Mountain Landfill and Recycling Center
Onsite Mobile Equipment Exhaust Emissions
Proposed Project Without Mitigation

	Operating Data				Emission Factors (lb/1000 gal)(1)					Daily Emissions (lbs/day)					Annual Emissions (tons/yr)				
	Number	Hrs/Day	Gals/Hr	Days/Yr	NOx	CO	PM10	VOC	SO2	NOx	CO	PM10	VOC	SO2	NOx	CO	PM10	VOC	SO2
PHASE I INTERMODAL/ TRUCK MARSHALING YARD																			
Overhead Crane	5	20	7	365	226.65	39.13	12.99	11.74	7.10	158.65	27.39	9.09	8.22	4.97	28.95	5.00	1.66	1.50	0.91
Rubber-Tired Loader	1	10	2.5	365	226.65	39.13	12.99	11.74	7.10	5.67	0.98	0.32	0.29	0.18	1.03	0.18	0.06	0.05	0.03
PHASE II INTERMODAL YARD																			
Overhead Crane	5	20	7	365	226.65	39.13	12.99	11.74	7.10	158.65	27.39	9.09	8.22	4.97	28.95	5.00	1.66	1.50	0.91
WASTE HAULING FROM PHASE I INTERMODAL YARD																			
Hostling Vehicle	28	10	7	365	226.65	39.13	12.99	11.74	7.10	412.50	71.22	23.64	21.37	12.92	75.28	13.00	4.32	3.90	2.36
WASTE HAULING FROM PHASE II INTERMODAL YARD																			
Hostling Vehicle	27	10	7	365	226.65	39.13	12.99	11.74	7.10	428.37	73.96	24.55	22.19	13.42	78.18	13.50	4.48	4.05	2.45
LANDFILL FACE																			
Crawler Tractor	12	10	13	365	226.65	39.13	12.99	11.74	7.10	353.57	61.04	20.27	18.31	11.08	64.53	11.14	3.70	3.34	2.02
Refuse Compactor	12	10	14	365	226.65	39.13	12.99	11.74	7.10	380.77	65.74	21.83	19.72	11.93	69.49	12.00	3.98	3.60	2.18
DAILY COVER EXCAVATION, HAULING AND SPREADING																			
Rubber-Tired Loader	2	10	12	365	226.65	39.13	12.99	11.74	7.10	54.40	9.39	3.12	2.82	1.70	9.93	1.71	0.57	0.51	0.31
Haul Truck	10	10	9.5	365	226.65	39.13	12.99	11.74	7.10	215.32	37.17	12.34	11.15	8.75	39.30	6.78	2.25	2.04	1.23
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
DUST CONTROL AND ROAD MAINTENANCE																			
Water Tanker	7	10	11	365	226.65	39.13	12.99	11.74	7.10	174.52	30.13	10.00	9.04	5.47	31.85	5.50	1.83	1.65	1.00
Motor Grader	3	10	6	365	226.65	39.13	12.99	11.74	7.10	40.80	7.04	2.34	2.11	1.28	7.45	1.29	0.43	0.39	0.23
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
Vacuum Sweeper	2	10	11	365	226.65	39.13	12.99	11.74	7.10	49.86	8.61	2.86	2.58	1.56	9.10	1.57	0.52	0.47	0.29
FINAL COVER EXCAVATION, HAULING AND SPREADING																			
Rubber-Tired Loader	1	10	7	365	226.65	39.13	12.99	11.74	7.10	15.87	2.74	0.91	0.82	0.50	2.90	0.50	0.17	0.15	0.09
Haul Truck	3	10	8	365	226.65	39.13	12.99	11.74	7.10	40.80	7.04	2.34	2.11	1.28	7.45	1.29	0.43	0.39	0.23
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
Compactor	1	10	10.5	365	226.65	39.13	12.99	11.74	7.10	23.80	4.11	1.36	1.23	0.75	4.34	0.75	0.25	0.22	0.14
LINER CONSTRUCTION CLAY MATERIAL																			
Frontend Loader	1	10	7	365	226.65	39.13	12.99	11.74	7.10	15.87	2.74	0.91	0.82	0.50	2.90	0.50	0.17	0.15	0.09
Haul Truck	1	10	6	365	226.65	39.13	12.99	11.74	7.10	13.60	2.35	0.78	0.70	0.43	2.48	0.43	0.14	0.13	0.08
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
Compactor	1	10	10.5	365	226.65	39.13	12.99	11.74	7.10	23.80	4.11	1.36	1.23	0.75	4.34	0.75	0.25	0.22	0.14
LINER CONSTRUCTION AGGREGATE MATERIAL																			
Frontend Loader	2	10	12	365	226.65	39.13	12.99	11.74	7.10	54.40	9.39	3.12	2.82	1.70	9.93	1.71	0.57	0.51	0.31
Haul Truck	9	10	9.5	365	226.65	39.13	12.99	11.74	7.10	193.78	33.46	11.11	10.04	6.07	35.37	6.11	2.03	1.83	1.11
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
Compactor	1	10	10.5	365	226.65	39.13	12.99	11.74	7.10	23.80	4.11	1.36	1.23	0.75	4.34	0.75	0.25	0.22	0.14
BENCH CLEARING																			
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
MISCELLANEOUS																			
Backhoe	2	10	2.5	365	226.65	39.13	12.99	11.74	7.10	11.33	1.96	0.65	0.59	0.36	2.07	0.36	0.12	0.11	0.06
Utility Truck	3	10	5	365	226.65	39.13	12.99	11.74	7.10	34.00	5.87	1.95	1.76	1.07	6.20	1.07	0.36	0.32	0.19
Grader	1	10	6	365	226.65	39.13	12.99	11.74	7.10	13.60	2.35	0.78	0.70	0.43	2.48	0.43	0.14	0.13	0.08
									TOTAL =	3,020.1	521.4	173.1	156.4	94.6	551.2	95.2	31.6	28.5	17.3

Footnote:
(1) NOx, CO, HC, and PM emission factors based on use of off-road engines meeting EPA's 1996 standards with manufacturers able to certify engines below standards by typical margins (i.e., 93% of NOx standard, 12% of CO standard, and 26% of HC standard based on results of 1993 EPA certification tests for on-road heavy-duty Diesel engines, 83% of PM standard based on EPA's PART5 model).
SOx emissions based on use of low sulfur fuel meeting CARB's 1993 standards.

Table A-2-2

Eagle Mountain Landfill and Recycling Center
Fugitive Dust Emissions
Proposed Project Without Mitigation

Activity	Operating Data: Daily Process Rate	Units	Annual Operation (days/yr)	TSP Emissions: Emission Factor(1) (lbs/unit)	Control Factor(2) (%)	Emission Rate (lbs/day)	PM10 Emissions: PM10 Conversion Factor(3)	Emission Rate (lbs/day)	Emission Rate (tons/yr)
Waste Hauling (From Phase I Yard)	760	vmt	365	3.87	95%	147.0	0.45	66.1	12.1
Waste Hauling (From Phase II Yard)	2504	vmt	365	3.87	95%	484.3	0.45	217.9	39.8
Daily Cover Excavation	20	hr	365	5.70	90%	11.4	0.13	1.5	0.3
Daily Cover Truck Loading	9396	ton	365	0.01	0%	113.5	0.47	53.7	9.8
Daily Cover Hauling	195	vmt	365	5.63	95%	55.0	0.45	24.8	4.5
Daily Cover Dumping	9396	ton	365	0.01	0%	113.5	0.47	53.7	9.8
Daily Cover Spreading	10	hr	365	5.70	0%	57.0	0.13	7.5	1.4
Final Cover Excavation	10	hr	365	5.70	90%	5.7	0.13	0.8	0.1
Final Cover Truck Loading	1449	ton	365	0.01	0%	17.5	0.47	8.3	1.5
Final Cover Hauling	110	vmt	365	3.87	95%	21.3	0.45	9.6	1.7
Final Cover Dumping	1449	ton	365	0.01	0%	17.5	0.47	8.3	1.5
Final Cover Spreading	10	hr	365	5.70	0%	57.0	0.13	7.5	1.4
Liner Material Hauling (Clay)	61	vmt	365	3.87	95%	11.8	0.45	5.3	1.0
Liner Material Excavation (Rock)	20	hr	365	5.70	90%	11.4	0.13	1.5	0.3
Liner Material Truck Loading (Rock)	8066	ton	365	0.00	0%	4.8	0.47	2.3	0.4
Liner Material Hauling (Rock)	206	vmt	365	5.63	95%	58.1	0.45	26.2	4.8
Liner Material Dumping (Rock)	8066	ton	365	0.00	0%	4.8	0.47	2.3	0.4
Liner Material Spreading (Rock)	10	hr	365	7.04	0%	70.4	0.13	9.3	1.7
Road Watering	490	vmt	365	1.31	95%	32.2	0.45	14.5	2.6
Paved Road Vacuuming	100	vmt	365	1.17	95%	5.8	0.20	1.1	0.2
Road Grading	60	vmt	365	0.23	60%	5.4	0.54	2.9	0.5
Road Blading	10	hr	365	4.36	0%	43.6	0.13	5.7	1.0
Bench Clearing	10	hr	365	5.70	30%	39.9	0.16	6.5	1.2
Backhoe	20	hr	365	0.04	30%	0.6	0.77	0.4	0.1
Utility Truck Travel	150	vmt	365	0.26	95%	1.9	0.45	0.9	0.2
Grader	20	vmt	365	0.23	60%	1.8	0.54	1.0	0.2
Windblown Dust (Unpaved Haul Roads)	890,419	sq.ft.	365	0.00001	0%	10.3	0.50	5.1	0.9
Windblown Dust (Daily Cover)	87,000	sq.ft.	365	0.00001	0%	1.0	0.50	0.5	0.1
Windblown Dust (Final Cover)	21,750	sq.ft.	365	0.00001	0%	0.3	0.50	0.1	0.0
Windblown Dust (Daily Cover Borrow Area)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Final Cover Borrow Area)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Liner Borrow Area- Rock)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Phase 1 Yard)	870,000	sq.ft.	365	0.00001	0%	10.0	0.50	5.0	0.9
Windblown Dust (Phase 2 Yard)	217,500	sq.ft.	365	0.00001	0%	2.5	0.50	1.3	0.2
Windblown Dust (Liner-Rock)	21,750	sq.ft.	365	0.00001	0%	0.3	0.50	0.1	0.0
Material Crushing Plant	308	ton	365	0.05	99%	0.2	0.88	0.2	0.0
Material Screening Plant	18,604	ton	365	0.04	99%	9.3	0.84	7.8	1.4
					TOTAL =	1427.5		559.7	102.1

Note: See notes on following page.

Footnotes (Fugitive Dust Emissions):

1.a. Waste Hauling: TSP emission factor is computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using a surface silt of 1.7%, vehicle speed of 30 mph, 6 wheels, 20 days precipitation, and an average vehicle weight of 30 tons. The silt content is from a 9/26/79 sieve analysis of the coarse tailing pile.

b. Daily Cover, Final Cover, Liner-Rock Excavation: TSP emission factor is from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95, for 1% silt, 1% moisture content. The silt and moisture contents are an estimate for low silt /dry material.

c. Road bulldozing: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95, for 1.7% silt, 2% moisture content. The silt content is from a 9/26/79 sieve analysis of the coarse tailing pile and the moisture content is an estimate for dry material.

d. Material Crushing Plant: TSP emission factor is calculated as the sum of emission factors for the process - 0.0003 lbs/ton dump hopper, 0.00294 lbs/ton for belt transfer, 0.005 lbs/ton for primary, secondary, and tertiary crushers, 0.0315 lbs/ton for screens, 0.00294 lbs/ton for stacker (AP-42, Table 11.19.2-2, 1/95).

e. Material Screening Plant: TSP emission factor is calculated as the sum of emission factors for the process - 0.0003 lbs/ton dump hopper, 0.00294 lbs/ton for belt transfer, 0.0315 lbs/ton for screens, 0.00294 lbs/ton for stacker (AP-42, Table 11.19.2-2, 1/95).

f. Daily Cover, Final Cover Truck Loading/Dumping: TSP emission factor from AP-42, Section 13.2.4-3, 1/95, using 8.3 mph wind and 1% moisture content. The average wind speed is from data collected by an onsite monitoring station while the moisture content is an estimate for dry material.

g. Liner-Rock Truck Loading/Dumping: TSP emission factor from AP-42, Section 13.2.4-3, 1/95, using 8.3 mph wind and 8.5% moisture content. The average wind speed is from data collected onsite and the moisture content is from Section 7.6 of the Report of Waste Discharge (ROWD), 1992, GeoSyntec.

h. Daily Cover and Final Cover Hauling: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 30 mph, 4 wheels, 20 days precipitation, and an average vehicle weight of 68.5 tons.

I. Daily Cover, Final Cover Spreading: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 1% silt, 1% moisture content. Silt and moisture contents are an estimate for low silt dry material.

j. Liner-Rock Spreading: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 12.2% silt, 8.5% moisture content. Silt and moisture contents from Section 7.6 of the Report of Waste Discharge (ROWD), 1992, GeoSyntec.

k. Road Watering: TSP emission factor computed from AP-42, Section 13.2.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 7 mph, 4 wheels, 20 days of precipitation, and an average vehicle weight of 68.5 tons.

l. Road Grading: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 2 mph.

m. Final Cover, Liner-Clay Hauling: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 30 mph, 6 wheels, 20 days of precipitation, and an average vehicle weight of 30 tons.

n. Bench Clearing: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 1% silt, 1% moisture content. The silt and moisture contents are an estimate for dry material.

o. Backhoe: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 1 mph.

p. Utility Truck: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 5 mph, 6 wheels, 20 days of precipitation, and an average vehicle weight of 8 tons.

q. Grader: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 2 mph.

r. Vacuum Sweeper: TSP emission factor computed from AP-42, Section 13.2.1 (Paved Roads), 1/95, using surface silt loading of 7.4 g/m^2 , and an average vehicle weight of 10 tons.

s. Wind Erosion: TSP emission factor computed from "Control of Open Fugitive Dust Sources", EPA-450/3-88-008, 9/88, using material size mode of 7.0 mm from 9/26/79 sieve analyses of coarse tailing pile, threshold friction velocity of 1.5 m/sec from Figure 6-1 of EPA document, roughness height of 0.1 m from Figure 6-4 of EPA document, and onsite wind data.

2.a. Waste, Daily Cover, Final Cover, Liner-Rock/Clay Hauling, Road Watering, Utility Truck: TSP control factor based on watering and/or application of chemical dust suppressant (see Bureau of Mines - United States Department of the Interior "Cost Effectiveness of Dust Controls Used On Unpaved Haul Roads", December 1983).

b. Daily Cover, Final Cover, Liner-Rock Excavation: TSP control factor is estimated from field data collected during the excavation of tailings at a former asbestos mine near Copperopolis, California.

c. Material Processing: TSP control factor is a composite weighted by emissions from each process: 80% control for dump hopper (from vendor literature and inspection of hoppers equipped with hollow cone spray nozzles), 99% control for belt transfers, screens, and crushers (estimated from vendor literature for pulse-jet dust collectors), 95% control for pile stacker (estimated from vendor literature and inspection of stackers with drop height controllers, midbelt deluge sprays, and head pulley solid cone nozzles).

d. Vacuum Sweeping: TSP control factor from AP-42, Section 13.2.1-1 (Paved Roads), 1/95, assuming water flushing of paved road surfaces reduces surface silt loading from 7.4 to 0.082 g/m2.

e. Road Grading: Same as TSP control factor used for road watering.

f. Bench Clearing: TSP control factor based on inspection of mining projects with heavy equipment operation and use of water for dust control.

g. Backhoe: TSP control factor based on inspection of pipeline construction projects with backhoe operation and use of water for dust control.

h. Grader: same as TSP control factor used for road watering.

3.a. Waste, Liner-Rock/Clay, Daily Cover, Final Cover Hauling, Utility Truck, Road Watering: PM10 conversion factor from AP-42, Section 13.2.2, 1/95.

b. Daily Cover, Final Cover, Liner-Rock Excavation: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

c. Material Processing: PM10 conversion factor is an emission-weighted average covering each item of operation - 50% dump hopper (AP-42, Table 11.24-2, 1/95), 100% for belt transfers, screens, crushers (all emissions from dust collectors assumed to be PM10), 50% pile stacker (AP-42, Table 11.24-2, 1/95).

d. Truck Loading: PM10 conversion factor from AP-42, Section 13.2.4-3, 1/95.

e. Truck Dumping: PM10 conversion factor from AP-42, Section 13.2.4-3, 1/95.

f. Daily Cover, Final Cover, Liner-Rock Spreading: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

g. Road Grading: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

h. Bench Clearing: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

I. Backhoe: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

j. Vacuum Sweeper: PM10 conversion factor from AP-42, Section 13.2.1-1, 1/95.

k. Wind Erosion: PM10 conversion factor from "Control of Open Fugitive Dust Sources", EPA-450/3-88-008, 9/88.

l. Grader: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

Table A-2-3

Eagle Mountain Landfill and Recycling Center Rail Emissions For Proposed Project Without Mitigation						
1. Basic Assumptions	Single Train Capacity (tons of Waste)					3,500
	Desired Daily Capacity (tons of Waste)					18,000
	Average Number of Trains per Day					5.14
2. Emission Factors in pounds per 1,000 gallons	HC	CO	NOx	PM	SO_2	
	22.5	71.5	502.5	11.3	38.0	
3. Fuel and Emission Results for a Single Train						
Trip Segment	Fuel Use Per Train (gallons)	Per train emissions in pounds				
		HC	CO	NOx	PM	SO2
Outbound trip(loaded)						
LACTC to Ferrum	1,955	44.0	139.8	982.4	22.1	74.3
Ferrum to Eagle Mountain	1,208	27.2	86.4	607.0	13.7	45.9
Total outbound trip	3,163	71.2	226.2	1,589.4	35.7	120.2
Return trip (empty)						
Eagle Mountain to Ferrum	249	5.6	17.8	125.1	2.8	9.5
Ferrum to LACTC	1,139	25.6	81.4	572.3	12.9	43.3
Total inbound trip	1,388	31.2	99.2	697.5	15.7	52.7
Round Trip Total, Single Train	**4,551**	**102.4**	**325.4**	**2,286.9**	**51.4**	**172.9**
4. Results for Average Operating Day						
Trip Segment	Daily Fuel Use (gallons)	Pounds per day from all trains				
		HC	CO	NOx	PM	SO2
LACTC to Ferrum (SP,loaded)	10,054	226	719	5,052	114	382
Ferrum to Eagle Mountain	6,213	140	444	3,122	70	236
Total outbound trip	16,267	366	1,163	8,174	184	618
Return Trip (empty)						
Eagle Mountain to Ferrum	1,281	29	92	643	14	49
Ferrum to LACTC (SP, empty)	5,858	132	419	2,944	66	223
Total inbound trip	7,138	161	510	3,587	81	271
Totals For Average Day	**23,405**	**527**	**1,673**	**11,761**	**264**	**889**
5. Annual Totals						
	Annual Fuel Use (gallons)	HC Tons per Year	CO Tons per Year	NOx Tons per Year	PM_{10} Tons per Year	SO_2 Tons per Year
Outbound Trip (loaded)						
LACTC to Ferrum	3,669,814	41	131	922	21	70
Ferrum to Eagle Mountain	2,267,589	26	81	570	13	43
Total outbound trip	5,937,403	67	212	1,492	34	113
Inbound Trip (empty)						
Eagle Mountain to Ferrum	467,409	5	17	117	3	9
Ferrum to LACTC (SP, empty)	2,138,066	24	76	537	12	41
Total inbound trip	2,605,474	29	93	655	15	50
Annual Totals	**8,542,877**	**96**	**305**	**2,146**	**48**	**162**

Table A-2-4

On-site Locomotive Emission Rates

Locomotive Emission Rate (grams per second) Per Locomotive

NOx	CO	PM	VOC	SO2
0.5392	0.2202	0.0161	0.0948	0.0591

Planned Project Without Mitigation

	Locomotive Hours		
	Max Hour	Max Day	Annual
Phase I yard	2	22.84	8,338
Phase II yard	2	28.56	10,423

	NOx	CO	PM10	VOC	SO2
Locomotives for one-hour average in grams per second					
Phase I yard	1.078	0.440	0.032	0.190	0.118
Phase II yard	1.078	0.440	0.032	0.190	0.118
Total	2.157	0.881	0.064	0.379	0.236
Locomotives for twenty-four-hour average in grams per second					
Phase I yard	0.513	0.210	0.015	0.090	0.056
Phase II yard	0.642	0.262	0.019	0.113	0.070
Total	1.155	0.472	0.034	0.203	0.127
Locomotives for annual average in grams per second					
Phase I yard	0.513	0.210	0.015	0.090	0.056
Phase II yard	0.642	0.262	0.019	0.113	0.070
Total	1.155	0.472	0.034	0.203	0.127
Locomotives for annual average in units of pounds per day					
Phase I yard	98	40	3	17	11
Phase II yard	122	50	4	21	13
Total	220	90	7	39	24
Locomotives for annual average in units of tons per year					
Phase I yard	18	7	1	3	2
Phase II yard	22	9	1	4	2
Total	40	16	1	7	4

Note: These emission rates apply to the following alternatives:
1. Proposed project
3. Alternate Road
4. Rail Only
7. No Townsite Development

Table A-2-5

Eagle Mountain Landfill and Recycling Center On-Highway Truck Emissions For Proposed Project Without Mitigation Haul 2,000 tons/day of Waste (100 trucks/day) Average Distance is a 225-mile round trip Emission Factors from EMFAC7F for Class 8B Trucks			
Species	Emission Factor (g/mi)	Emissions	
		lb/day	tons/yr
Total Organic Gases (TOG)	1.98	98	18
Reactive Organic Gases (ROG)	1.90	94	17
CO	9.10	451	82
NOx	18.95	940	172
PM_{10} (Exhaust)	1.91	95	17
PM_{10} (Tire Wear)	0.66	33	6
Total PM_{10}	2.57	127	23
SO_2	0.52	26	5

Table A-2-6

Yard Truck Emission Rates without Mitigation

Truck Emission Factors (g/mi) from EMFAC7F

	NOx	CO	PM	VOC	SO2
Basic Emission Factors (g/mi)	18.95	9.10	2.57	1.90	0.52
Speed Correction Factors	1.574	2.661	1.000	1.935	1.000
Emission Factors (g/mi) at 5 mph	29.83	24.22	2.57	3.67	0.52
Grams/second at 5 mph	0.04143	0.03363	0.00357	0.00509	0.00072

Truck Idle Emissions from EPA (at 700 RPM idle with air conditioning)

As reported in grams/hr	223.00	22.00	no data	28.00	3.57
Converted to grams/second	0.06194	0.00611	0.00357	0.00778	0.00099

Total (g/s) for 6 minutes travel at 5 mph and 54 minutes of idle per hour

Gram per second emissions	0.05989	0.00886	0.00357	0.00751	0.00097

	Truck Hours		
	Max hour	Max day	year
Phase I	10	100	36,500
Phase II	0	0	0

	NOx	CO	PM10	VOC	SO2
Truck gram per second emissions for one-hour average					
Phase I yard	0.599	0.089	0.036	0.075	0.010
Phase II yard	0.000	0.000	0.000	0.000	0.000
Total	0.599	0.089	0.036	0.075	0.010
Truck gram per second emissions for twenty-four-hour average					
Phase I yard	0.250	0.037	0.015	0.031	0.004
Phase II yard	0.000	0.000	0.000	0.000	0.000
Total	0.250	0.037	0.015	0.031	0.004
Truck gram per second emissions for annual average					
Phase I yard	0.250	0.037	0.015	0.031	0.004
Phase II yard	0.000	0.000	0.000	0.000	0.000
Total	0.250	0.037	0.015	0.031	0.004
Annual Average Truck Emissions in pounds per day					
Phase I yard	48	7	3	6	1
Phase II yard	0	0	0	0	0
Total	48	7	3	6	1

Annual Average Truck Emissions in tons per year

Phase I yard	9	1	1	1	0
Phase II yard	0	0	0	0	0
Total	9	1	1	1	0

These emission rates apply to all unmitigated cases where trucks are used. These are:

1. Planned Project
3. Reduced Volume Alternative
4. Alternative Road
6. No Land Exchange
7. No Townsite

Table A-2-7

Eagle Mountain Landfill and Recycling Center
VOC Emissions - Maintenance Shop
Proposed Project Without Mitigation

	Daily Process Rate	Units	Annual Operation (days/yr)	VOC(1) Emission Factor (lbs/unit)	VOC Control Efficiency	VOC Emission (lbs/day)	VOC Emission (tons/yr)
Paint Booth (top coat)	2.0	gals	365	3.50	0.0%	7.00	1.28
Paint Booth (primer)	2.0	gals	365	0.60	0.0%	1.20	0.22
Paint Booth (solvent)	0.6	gals	365	6.33	0.0%	3.80	0.69
					Total =	12.00	2.19

Footnotes:
(1) For primer and topcoat, emission factor based on use of low VOC products.
For solvent, emissions factor based on use of VM&P naphtha.

Eagle Mountain Landfill and Recycling Center
Particulate Emissions - Maintenance Shop
Proposed Project Without Mitigation

	Daily Process Rate	Units	Annual Operation (days/yr)	TSP(1) Emission Factor (lbs/unit)	TSP(2) Control Efficiency	TSP Emission (lbs/day)	PM10(3) Fraction	PM10 Emission (lbs/day)	PM10 Emission (tons/yr)
Sandblaster (abrasive)	50	lbs	365	0.04	90.0%	0.21	0.22	0.05	0.01
Sandblaster (paint chips)	45	sq. ft.	365	0.01	90.0%	0.05	1.00	0.05	0.01
					Subtotal =	0.25		0.09	0.02
Paint Booth (top coat)	2.0	gals	365	2.63	95.0%	0.26	1.00	0.26	0.05
Paint Booth (primer)	2.0	gals	365	1.41	95.0%	0.14	1.00	0.14	0.03
Paint Booth (solvent)	0.6	gals	365	N/A					
					Subtotal =	0.40		0.40	0.07
					Total =	0.66		0.50	0.09

Footnotes:
(1) For sandblaster, emission factor from South Coast AQMD permitting manual for sandblasting.
For paint booth, emission factor based on solids content of coating and assumes 65% coating transfer efficiency.
(2) For sandblaster, control efficiency supplied by manufacturer of portable sandblasting units.
For paint booth, control efficiency supplied by manufacturer of dry filters for paint booths.
(3) For sandblaster, PM10 fraction from "Fugitive Dust Control Technology", Noyes Data Corp., Park Ridge, New Jersey, 1983.
For coatings, assume 100% of particulate is PM10.

Eagle Mountain Landfill and Recycling Center
Particulate Emissions
Locomotive Sand Silo
Proposed Project Without Mitigation

	Daily Process Rate	Units	Annual Operation (days/yr)	TSP(1) Emission Factor (lbs/unit)	TSP(2) Control Efficiency	TSP Emission (lbs/day)	PM10(3) Fraction	PM10 Emission (lbs/day)	PM10 Emission (tons/yr)
Silo Loading	50.0	tons	365	0.27	0.99	0.13	0.47	0.06	0.01
Sand Transfer	50.0	tons	365	0.27	0.99	0.13	0.47	0.06	0.01
Locomotive Loading	28.8	tons	365	0.27	0.99	0.08	0.47	0.04	0.01
					Total =	0.35		0.16	0.03

Footnotes:
(1) From AP-42, Table 11.12-2 (pneumatic cement loading to silo), 1/95.
(2) Typical control for baghouse or dry dust collector.
(3) From AP-42, Section 13.2.4, 1/95, PM10 fraction for aggregate handling equipment.

Table A-2-8

Eagle Mountain Landfill and Recycling Center
Fuel Storage Tanks
Proposed Project Without Mitigation

	Tank Throughput(1) Daily (mgals)	Annual (mgals)	VOC(2) Working Losses (lbs/mgal)	VOC(2) Breathing Losses (lbs/mgal)	VOC(2) Refueling Losses (lbs/mgal)	Daily VOC Emissions Working Losses (lbs/day)	Breathing Losses (lbs/day)	Refueling Losses (lbs/day)	Daily Emission (lbs/day)	Annual VOC Emissions Working Losses (tons/yr)	Breathing Losses (tons/yr)	Refueling Losses (tons/yr)	Annual Emission (tons/yr)
Onsite Mobile (Diesel)	13.33	4863.6	0.0240	0.0004	N/A	0.32	0.01	0.00	0.33	0.06	0.00	0.00	0.06
Rail (Diesel)	7.49	2735.1	0.0240	0.0004	N/A	0.18	0.00	0.00	0.18	0.03	0.00	0.00	0.03
Onsite Mobile (Gasoline)	0.63	230.0	0.3000	1.0000	1.8000	0.19	0.63	1.13	1.95	0.03	0.11	0.21	0.36
								Total =	2.46				0.45

Footnotes:
(1) For Diesel tanks, fuel use based on number of Diesel equipment and daily/annual operation. For gasoline tanks, throughput is worst case estimate.
(2) For Diesel tanks, emission factors from EPA Tanks Model assuming storage of Diesel fuel.
For gasoline tanks, emission factors from AP-42, Table 4.4-7, 9/85 for tank equipped with Phase I and II systems.

Table A-2-9

Eagle Mountain Landfill and Recycling Center
Emergency Generator Emissions
Proposed Project Without Mitigation

	Operating Data(1)				Emission Factors (lbs/hp-hr)(2)					Emissions (lbs/day)					Emissions (tons/yr)				
	Number	Hrs/Day	Horsepower	Days/Yr	NOx	CO	PM10	VOC	SOx	NOx	CO	PM10	VOC	SOx	NOx	CO	PM10	VOC	SOx
Emergency Generators	2	1	168	52	0.0113	0.0860	0.0001	0.0003	0.0000	3.81	28.89	0.04	0.11	0.00	0.10	0.75	0.00	0.00	0.00

Footnotes:
(1) Based on engine operation necessary for maintenance purposes.
(2) Emission factors based on information supplied by engine vendor for a natural gas-fired, turbocharged, aftercooled engine.

Table A-2-10

Eagle Mountain Landfill and Recycling Center
Flare Station Emissions
Proposed Project

Information Source	Emission Factors (lbs/MMBtu) NOx	CO	PM10	VOC	SOx
SCAQMD BACT (1)	0.060	N/A	N/A	N/A	N/A
SCAQMD Test Data (2)				0.022	
SCAQMD Rule 431.1 (3)					0.014
Vendor Data (4)	0.054	0.270	0.024	N/A	N/A
Puente Hills (5)	0.083	0.068	N/A	0.080	0.011
BKK (5)	0.013	0.482	0.028	0.022	0.005
Milliken (6)	0.141	0.132	N/A	0.136	N/A
Best Estimate	0.054	0.27	0.024	0.022	0.014

Maximum Landfill Gas Production Rate =	46000	scfm
	66.24	MMscf/day
Landfill Gas Heat Content (HHV) =	505	BTU/scf
Maximum Heat Input =	1394	MMBTU/hr

	NOx	CO	PM10	VOC	SOx
Emission Factors (lb/MMBTU)	0.054	0.270	0.024	0.022	0.014
Control Efficiency (7):	30%	90%	N/A	50%	N/A
Emissions (lb/hr)	52.7	37.6	33.5	15.3	19.5
(lb/day)	1264.5	903.2	802.8	368.0	468.3
(tons/yr)	230.8	164.8	146.5	67.2	85.5
Emissions Per Flare (g/sec)	0.83	0.59	0.53	0.24	0.31

Footnotes:
(1) From South Coast AQMD Best Available Control Technology Guidelines, January 1990.
(2) From a collection of test data compiled by the South Coast AQMD for Prima, Santiago, El Sobrante, Chiquita, and Puente Hills landfills showing NMHC contents of raw landfill gas. VOC emission factor based on raw landfill NMHC content of 13,410 ppmv and vendor guaranteed NMHC flare destruction efficiency of 98%.
(3) Based on raw landfill gas sulfur content of 40 ppmv as limited by South Coast AQMD Rule 431.1 (as amended October 2, 1992).
(4) Manufacturer's guarantee.
(5) California Air Resources Board source test, July 1986.
(6) South Coast AQMD source test, July 1988.
(7) Reflects use of urea injection (or equivalent) for NOx control, oxidation catalyst for CO and VOC control.

Eagle Mountain Landfill and Recycling Center - Fugitive Landfill Gaa Emissions

Receptor	Unit CH4 Emission Rate (g/s)	Unit CH4 Emission Rate (lbs/hr)	Unit CH4 Impact(1) (ug/m3)	Unit CH4 Impact (ppmv)	CH4 Emiss. Rate @ 50 ppmv(2) (lbs/hr)	CH4 Flow (scfm)	Landfill Gas(3) Flow (scfm)	VOC(4) Flow (scfm)	VOC Emiss. (lbs/hr)	VOC Emiss. (lbs/day)	VOC Emiss. (tons/yr)
Highest Max. Impact	1	7.9	47.6	0.072	5,544	2,226	4,453	5	13.0	311.4	56.8

Footnotes:
(1) Using SCREEN3 model (see attached modeling input/output files) and area source characteristics shown below.
(2) Rule 1150.1(c)(5) as adopted April 5, 1985, average allowed surface THC concentration.
(3) Based on typical CH4 content of landfill gas of 50%.
(4) Based typical VOC content of landfill gas of 1170 ppmv shown in AP-42, Section 2.4, 1/95.

Eagle Mountain Landfill and Recycling Center
Gas Collection System Capture Efficiency

Maximum andfill Ga Generation Rate(1) (scfm)	Maximum Fugitive andfill Ga Generation Rate(2) (scfm)	Minimum Gas Collection System Capture Efficiency
46,000	4,453	90.3%

Footnotes:
(1) From Part 5 of Air Quality Impact Section.
(2) From above table.

Eagle Mountain Landfill and Recycling Center - Surface Area Characteristics

Landfill Phase	Surface Area(1) (acres)	Develp. Period(1) (years)	Annual Develp. (acres/yr)	Landfill Gas Generation Period(2) (years)	Surface Area With Active Landfill Gas Generation (acres)	Landfill Gas Release Height(3) (meters)
Phase 1	319	17	18.8	37	694	2
Phase 2	312	11	28.4	37	1,049	2
Phase 3	703	31	22.7	37	839	2
Phase 4	534	19	28.1	37	1,040	2
				Average =	906 acres	
					3,665,275 sq. meters	

Footnotes:
(1) From "Eagle Mountain Landfill and Recycling Center Project Description", CH2M Hill, 9/19/95.
(2) From EPA "Air Emissions from Municipal Solid Waste Landfills - Background Information for Proposed Standards and Guidelines", March 1991, Section 3.2.4.4, average number of years for methane production.
(3) From April 1992 "Revised Health Risk Assessment For The Eagle Mountain Landfill Project".

12/22/95
15:09:13

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

Eagle Mountain Landfill and Recycling Center

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.272830E-06
SOURCE HEIGHT (M)	=	2.0000
LENGTH OF LARGER SIDE (M)	=	1914.4900
LENGTH OF SMALLER SIDE (M)	=	1914.4900
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
0.	33.77	6	1.0	1.0	10000.0	2.00	45.
1.	33.78	6	1.0	1.0	10000.0	2.00	45.
10.	33.89	6	1.0	1.0	10000.0	2.00	45.
50.	34.44	6	1.0	1.0	10000.0	2.00	43.
100.	35.27	6	1.0	1.0	10000.0	2.00	45.
150.	35.92	6	1.0	1.0	10000.0	2.00	45.
200.	36.57	6	1.0	1.0	10000.0	2.00	45.
250.	37.20	6	1.0	1.0	10000.0	2.00	45.
300.	37.82	6	1.0	1.0	10000.0	2.00	45.
400.	39.03	6	1.0	1.0	10000.0	2.00	45.
500.	40.19	6	1.0	1.0	10000.0	2.00	45.
750.	42.89	6	1.0	1.0	10000.0	2.00	45.
1000.	45.37	6	1.0	1.0	10000.0	2.00	45.
1250.	46.67	6	1.0	1.0	10000.0	2.00	45.
1500.	41.67	6	1.0	1.0	10000.0	2.00	45.
950.	44.89	6	1.0	1.0	10000.0	2.00	45.
1100.	46.30	6	1.0	1.0	10000.0	2.00	45.
1350.	47.58	6	1.0	1.0	10000.0	2.00	45.
1400.	45.83	6	1.0	1.0	10000.0	2.00	45.
1300.	47.14	6	1.0	1.0	10000.0	2.00	42.

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
IMPLE TERRAIN	47.58	1350.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

Section A-3
Eagle Mountain Landfill and Recycling Center
Emissions Calculations
Proposed Project With Mitigation

Table A-3-1

Eagle Mountain Landfill and Recycling Center
Onsite Mobile Equipment Exhaust Emissions
Proposed Project With Mitigation

	Number	Operating Data Hrs/Day	Gals/Hr	Days/Yr	Emission Factors (lb/1000 gal)(1) NOx	CO	PM10	VOC	SO2	Daily Emissions (lbs/day) NOx	CO	PM10	VOC	SO2	Annual Emissions (tons/yr) NOx	CO	PM10	VOC	SO2
PHASE I INTERMODAL/ TRUCK MARSHALING YARD																			
Overhead Crane	5	20	7	365	125.22	39.13	12.99	11.74	7.10	87.65	27.39	9.09	8.22	4.97	16.00	5.00	1.66	1.50	0.91
Rubber-Tired Loader	1	10	2.5	365	125.22	39.13	12.99	11.74	7.10	3.13	0.98	0.32	0.29	0.18	0.57	0.18	0.06	0.05	0.03
PHASE II INTERMODAL YARD																			
Overhead Crane	5	20	7	365	125.22	39.13	12.99	11.74	7.10	87.65	27.39	9.09	8.22	4.97	16.00	5.00	1.66	1.50	0.91
WASTE HAULING FROM PHASE I INTERMODAL YARD																			
Hostling Vehicle	26	10	7	365	62.61	74.35	3.25	11.74	7.10	113.95	135.32	5.91	21.37	12.92	20.80	24.70	1.08	3.90	2.36
WASTE HAULING FROM PHASE II INTERMODAL YARD																			
Hostling Vehicle	27	10	7	365	62.61	74.35	3.25	11.74	7.10	118.33	140.52	6.14	22.19	13.42	21.60	25.65	1.12	4.05	2.45
LANDFILL FACE																			
Crawler Tractor	12	10	13	365	125.22	39.13	12.99	11.74	7.10	195.34	61.04	20.27	18.31	11.08	35.65	11.14	3.70	3.34	2.02
Refuse Compactor	12	10	14	365	125.22	39.13	12.99	11.74	7.10	210.37	65.74	21.83	19.72	11.93	38.39	12.00	3.98	3.60	2.18
DAILY COVER EXCAVATION, HAULING AND SPREADING																			
Rubber-Tired Loader	2	10	12	365	125.22	39.13	12.99	11.74	7.10	30.05	9.39	3.12	2.82	1.70	5.48	1.71	0.57	0.51	0.31
Haul Truck	10	10	9.5	365	62.61	74.35	3.25	11.74	7.10	59.48	70.63	3.09	11.15	6.75	10.86	12.89	0.56	2.04	1.23
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
DUST CONTROL AND ROAD MAINTENANCE																			
Water Tanker	7	10	11	365	62.61	74.35	3.25	11.74	7.10	48.21	57.25	2.50	9.04	5.47	8.80	10.45	0.46	1.65	1.00
Motor Grader	3	10	8	365	125.22	39.13	12.99	11.74	7.10	22.54	7.04	2.34	2.11	1.28	4.11	1.29	0.43	0.39	0.23
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
Vacuum Sweeper	2	10	11	365	62.61	74.35	3.25	11.74	7.10	13.77	16.36	0.71	2.58	1.56	2.51	2.99	0.13	0.47	0.29
FINAL COVER EXCAVATION, HAULING AND SPREADING																			
Rubber-Tired Loader	1	10	7	365	125.22	39.13	12.99	11.74	7.10	8.77	2.74	0.91	0.82	0.50	1.60	0.50	0.17	0.15	0.09
Haul Truck	3	10	8	365	62.61	74.35	3.25	11.74	7.10	11.27	13.36	0.58	2.11	1.28	2.06	2.44	0.11	0.39	0.23
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
Compactor	1	10	10.5	365	125.22	39.13	12.99	11.74	7.10	13.15	4.11	1.36	1.23	0.75	2.40	0.75	0.25	0.22	0.14
LINER CONSTRUCTION CLAY MATERIAL																			
Frontend Loader	1	10	7	365	125.22	39.13	12.99	11.74	7.10	8.77	2.74	0.91	0.82	0.50	1.60	0.50	0.17	0.15	0.09
Haul Truck	1	10	8	365	62.61	74.35	3.25	11.74	7.10	3.76	4.46	0.19	0.70	0.43	0.69	0.81	0.04	0.13	0.08
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
Compactor	1	10	10.5	365	125.22	39.13	12.99	11.74	7.10	13.15	4.11	1.36	1.23	0.75	2.40	0.75	0.25	0.22	0.14
LINER CONSTRUCTION AGGREGATE MATERIAL																			
Frontend Loader	2	10	12	365	125.22	39.13	12.99	11.74	7.10	30.05	9.39	3.12	2.82	1.70	5.48	1.71	0.57	0.51	0.31
Haul Truck	9	10	9.5	365	62.61	74.35	3.25	11.74	7.10	53.53	63.57	2.78	10.04	6.07	9.77	11.60	0.51	1.83	1.11
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
Compactor	1	10	10.5	365	125.22	39.13	12.99	11.74	7.10	13.15	4.11	1.36	1.23	0.75	2.40	0.75	0.25	0.22	0.14
BENCH CLEARING																			
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
MISCELLANEOUS																			
Backhoe	2	10	2.5	365	125.22	39.13	12.99	11.74	7.10	6.26	1.96	0.65	0.59	0.36	1.14	0.36	0.12	0.11	0.06
Utility Truck	3	10	5	365	62.61	74.35	3.25	11.74	7.10	9.39	11.15	0.49	1.76	1.07	1.71	2.04	0.09	0.32	0.19
Grader	1	10	8	365	125.22	39.13	12.99	11.74	7.10	7.51	2.35	0.78	0.70	0.43	1.37	0.43	0.14	0.13	0.08
								TOTAL =		1,236.9	764.3	105.9	158.4	94.6	225.7	139.5	19.3	28.5	17.3

Footnote:
(1) For haul trucks, water trucks, and hostling vehicles, CO, PM10, and HC emission factors based on use of on-road engines meeting EPA's 1998 standards with manufacturers able to certify engines below standards by typical margins (i.e., 12% of CO standard and 26% of HC standard based on results of 1993 EPA certification tests for on-road heavy-duty Diesel engines, 83% of PM standard based on EPA PART5 model). NOx emission factor based on use of on-road engines meeting standards discussed in EPA's notice of proposed rulemaking for heavy-duty on-road engines (60 FR 45580) with manufacturers able to certify engines below standards by typical margins (i.e., 80% of NOx standard based on EPA Mobile5a model) . SOx emission factors based on use of low sulfur fuel meeting CARB's 1993 standards.

For bulldozers, loaders, scrappers, and crawler tractors, CO, HC, and PM emission factors based on use of off-road engines meeting EPA's 1996 standards with manufacturers able to certify engines below standards by typical margins (i.e., 12% of CO standard and 26% of HC standard based on results of 1993 EPA certification tests for on-road heavy-duty Diesel engines, 83% of PM standard based on EPA PART5 model). NOx emission factor based on use of off-road engines meeting levels expected in future EPA rulemaking for off-road Diesel engines with manufacturers able to certify engines below standards by typical margins (i.e., 80% of NOx standard based on EPA Mobile5a model) . SOx emission factors based on use of low sulfur fuel meeting CARB's 1993 standards.

Table A-3-2

Eagle Mountain Landfill and Recycling Center
Fugitive Dust Emissions
Proposed Project With Mitigation

Activity	Operating Data: Daily Process Rate	Units	Annual Operation (days/yr)	TSP Emissions: Emission Factor(1) (lbs/unit)	Control Factor(2) (%)	Emission Rate (lbs/day)	PM10 Emissions: PM10 Conversion Factor(3)	Emission Rate (lbs/day)	Emission Rate (tons/yr)
Waste Hauling (From Phase I Yard)	760	vmt	365	3.87	95%	147.0	0.45	66.1	12.1
Waste Hauling (From Phase II Yard)	2504	vmt	365	3.87	95%	484.3	0.45	217.9	39.8
Daily Cover Excavation	20	hr	365	5.70	90%	11.4	0.13	1.5	0.3
Daily Cover Truck Loading	9396	ton	365	0.01	0%	113.5	0.47	53.7	9.8
Daily Cover Hauling	195	vmt	365	5.63	95%	55.0	0.45	24.8	4.5
Daily Cover Dumping	9396	ton	365	0.01	0%	113.5	0.47	53.7	9.8
Daily Cover Spreading	10	hr	365	5.70	0%	57.0	0.13	7.5	1.4
Final Cover Excavation	10	hr	365	5.70	90%	5.7	0.13	0.8	0.1
Final Cover Truck Loading	1449	ton	365	0.01	0%	17.5	0.47	8.3	1.5
Final Cover Hauling	110	vmt	365	3.87	95%	21.3	0.45	9.6	1.7
Final Cover Dumping	1449	ton	365	0.01	0%	17.5	0.47	8.3	1.5
Final Cover Spreading	10	hr	365	5.70	0%	57.0	0.13	7.5	1.4
Liner Material Hauling (Clay)	61	vmt	365	3.87	95%	11.8	0.45	5.3	1.0
Liner Material Excavation (Rock)	20	hr	365	5.70	90%	11.4	0.13	1.5	0.3
Liner Material Truck Loading (Rock)	8066	ton	365	0.00	0%	4.8	0.47	2.3	0.4
Liner Material Hauling (Rock)	206	vmt	365	5.63	95%	58.1	0.45	26.2	4.8
Liner Material Dumping (Rock)	8066	ton	365	0.00	0%	4.8	0.47	2.3	0.4
Liner Material Spreading (Rock)	10	hr	365	7.04	0%	70.4	0.13	9.3	1.7
Road Watering	490	vmt	365	1.31	95%	32.2	0.45	14.5	2.6
Paved Road Vacuuming	100	vmt	365	1.17	95%	5.8	0.20	1.1	0.2
Road Grading	60	vmt	365	0.23	60%	5.4	0.54	2.9	0.5
Road Blading	10	hr	365	4.36	0%	43.6	0.13	5.7	1.0
Bench Clearing	10	hr	365	5.70	30%	39.9	0.16	6.5	1.2
Backhoe	20	hr	365	0.04	30%	0.6	0.77	0.4	0.1
Utility Truck Travel	150	vmt	365	0.26	95%	1.9	0.45	0.9	0.2
Grader	20	vmt	365	0.23	60%	1.8	0.54	1.0	0.2
Windblown Dust (Unpaved Haul Roads)	890,419	sq.ft.	365	0.00001	0%	10.3	0.50	5.1	0.9
Windblown Dust (Daily Cover)	87,000	sq.ft.	365	0.00001	0%	1.0	0.50	0.5	0.1
Windblown Dust (Final Cover)	21,750	sq.ft.	365	0.00001	0%	0.3	0.50	0.1	0.0
Windblown Dust (Daily Cover Borrow Area)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Final Cover Borrow Area)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Liner Borrow Area- Rock)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Phase 1 Yard)	870,000	sq.ft.	365	0.00001	0%	10.0	0.50	5.0	0.9
Windblown Dust (Phase 2 Yard)	217,500	sq.ft.	365	0.00001	0%	2.5	0.50	1.3	0.2
Windblown Dust (Liner-Rock)	21,750	sq.ft.	365	0.00001	0%	0.3	0.50	0.1	0.0
Material Crushing Plant	308	ton	365	0.05	99%	0.2	0.88	0.2	0.0
Material Screening Plant	18,604	ton	365	0.04	99%	9.3	0.84	7.8	1.4
					TOTAL =	1427.5		559.7	102.1

Note: See notes on following page.

Footnotes (Fugitive Dust Emissions):

1.a. Waste Hauling: TSP emission factor is computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using a surface silt of 1.7%, vehicle speed of 30 mph, 6 wheels, 20 days precipitation, and an average vehicle weight of 30 tons. The silt content is from a 9/26/79 sieve analysis of the coarse tailing pile.

b. Daily Cover, Final Cover, Liner-Rock Excavation: TSP emission factor is from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95, for 1% silt, 1% moisture content. The silt and moisture contents are an estimate for low silt /dry material.

c. Road bulldozing: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95, for 1.7% silt, 2% moisture content. The silt content is from a 9/26/79 sieve analysis of the coarse tailing pile and the moisture content is an estimate for dry material.

d. Material Crushing Plant: TSP emission factor is calculated as the sum of emission factors for the process - 0.0003 lbs/ton dump hopper, 0.00294 lbs/ton for belt transfer, 0.005 lbs/ton for primary, secondary, and tertiary crushers, 0.0315 lbs/ton for screens, 0.00294 lbs/ton for stacker (AP-42, Table 11.19.2-2, 1/95).

e. Material Screening Plant: TSP emission factor is calculated as the sum of emission factors for the process - 0.0003 lbs/ton dump hopper, 0.00294 lbs/ton for belt transfer, 0.0315 lbs/ton for screens, 0.00294 lbs/ton for stacker (AP-42, Table 11.19.2-2, 1/95).

f. Daily Cover, Final Cover Truck Loading/Dumping: TSP emission factor from AP-42, Section 13.2.4-3, 1/95, using 8.3 mph wind and 1% moisture content. The average wind speed is from data collected by an onsite monitoring station while the moisture content is an estimate for dry material.

g. Liner-Rock Truck Loading/Dumping: TSP emission factor from AP-42, Section 13.2.4-3, 1/95, using 8.3 mph wind and 8.5% moisture content. The average wind speed is from data collected onsite and the moisture content is from Section 7.6 of the Report of Waste Discharge (ROWD), 1992, GeoSyntec.

h. Daily Cover and Final Cover Hauling: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 30 mph, 4 wheels, 20 days precipitation, and an average vehicle weight of 68.5 tons.

i. Daily Cover, Final Cover Spreading: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 1% silt, 1% moisture content. Silt and moisture contents are an estimate for low silt dry material.

j. Liner-Rock Spreading: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 12.2% silt, 8.5% moisture content. Silt and moisture contents from Section 7.6 of the Report of Waste Discharge (ROWD), 1992, GeoSyntec.

k. Road Watering: TSP emission factor computed from AP-42, Section 13.2.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 7 mph, 4 wheels, 20 days of precipitation, and an average vehicle weight of 68.5 tons.

l. Road Grading: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 2 mph.

m. Final Cover, Liner-Clay Hauling: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 30 mph, 6 wheels, 20 days of precipitation, and an average vehicle weight of 30 tons.

n. Bench Clearing: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 1% silt, 1% moisture content. The silt and moisture contents are an estimate for dry material.

o. Backhoe: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 1 mph.

p. Utility Truck: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 5 mph, 6 wheels, 20 days of precipitation, and an average vehicle weight of 8 tons.

q. Grader: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 2 mph.

r. Vacuum Sweeper: TSP emission factor computed from AP-42, Section 13.2.1 (Paved Roads), 1/95, using surface silt loading of 7.4 g/m^2 , and an average vehicle weight of 10 tons.

s. Wind Erosion: TSP emission factor computed from "Control of Open Fugitive Dust Sources", EPA-450/3-88-008, 9/88, using material size mode of 7.0 mm from 9/26/79 sieve analyses of coarse tailing pile, threshold friction velocity of 1.5 m/sec from Figure 6-1 of EPA document, roughness height of 0.1 m from Figure 6-4 of EPA document, and onsite wind data.

2.a. Waste, Daily Cover, Final Cover, Liner-Rock/Clay Hauling, Road Watering, Utility Truck: TSP control factor based on watering and/or application of chemical dust suppressant (see Bureau of Mines - United States Department of the Interior "Cost Effectiveness of Dust Controls Used On Unpaved Haul Roads", December 1983).

b. Daily Cover, Final Cover, Liner-Rock Excavation: TSP control factor is estimated from field data collected during the excavation of tailings at a former asbestos mine near Copperopolis, California.

c. Material Processing: TSP control factor is a composite weighted by emissions from each process: 80% control for dump hopper (from vendor literature and inspection of hoppers equipped with hollow cone spray nozzles), 99% control for belt transfers, screens, and crushers (estimated from vendor literature for pulse-jet dust collectors), 95% control for pile stacker (estimated from vendor literature and inspection of stackers with drop height controllers, midbelt deluge sprays, and head pulley solid cone nozzles).

d. Vacuum Sweeping: TSP control factor from AP-42, Section 13.2.1-1 (Paved Roads), 1/95, assuming water flushing of paved road surfaces reduces surface silt loading from 7.4 to 0.082 g/m2.

e. Road Grading: Same as TSP control factor used for road watering.

f. Bench Clearing: TSP control factor based on inspection of mining projects with heavy equipment operation and use of water for dust control.

g. Backhoe: TSP control factor based on inspection of pipeline construction projects with backhoe operation and use of water for dust control.

h. Grader: same as TSP control factor used for road watering.

3.a. Waste, Liner-Rock/Clay, Daily Cover, Final Cover Hauling, Utility Truck, Road Watering: PM10 conversion factor from AP-42, Section 13.2.2, 1/95.

b. Daily Cover, Final Cover, Liner-Rock Excavation: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

c. Material Processing: PM10 conversion factor is an emission-weighted average covering each item of operation - 50% dump hopper (AP-42, Table 11.24-2, 1/95), 100% for belt transfers, screens, crushers (all emissions from dust collectors assumed to be PM10), 50% pile stacker (AP-42, Table 11.24-2, 1/95).

d. Truck Loading: PM10 conversion factor from AP-42, Section 13.2.4-3, 1/95.

e. Truck Dumping: PM10 conversion factor from AP-42, Section 13.2.4-3, 1/95.

f. Daily Cover, Final Cover, Liner-Rock Spreading: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

g. Road Grading: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

h. Bench Clearing: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

I. Backhoe: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

j. Vacuum Sweeper: PM10 conversion factor from AP-42, Section 13.2.1-1, 1/95.

k. Wind Erosion: PM10 conversion factor from "Control of Open Fugitive Dust Sources", EPA-450/3-88-008, 9/88.

l. Grader: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

Table A-3-3

Eagle Mountain Landfill and Recycling Center
Fuel Storage Tanks
Proposed Project With Mitigation

	Tank Throughput(1) Daily (mgals)	Annual (mgals)	VOC(2) Working Losses (lbs/mgal)	VOC(2) Breathing Losses (lbs/mgal)	VOC(2) Refueling Losses (lbs/mgal)	Working Losses (lbs/day)	Daily VOC Emissions Breathing Losses (lbs/day)	Refueling Losses (lbs/day)	Daily Emission (lbs/day)	Working Losses (tons/yr)	Annual VOC Emissions Breathing Losses (tons/yr)	Refueling Losses (tons/yr)	Annual Emission (tons/yr)
Onsite Mobile (Diesel)	11.97	4369.1	0.0240	0.0004	N/A	0.29	0.00	0.00	0.29	0.05	0.00	0.00	0.05
Rail (Diesel)	7.49	2735.1	0.0240	0.0004	N/A	0.18	0.00	0.00	0.18	0.03	0.00	0.00	0.03
Onsite Mobile (Gasoline)	0.63	230.0	0.3000	1.0000	1.8000	0.19	0.63	1.13	1.95	0.03	0.11	0.21	0.36
								Total =	2.43				0.44

Footnotes:
(1) For Diesel tanks, fuel use based on number of Diesel equipment and daily/annual operation. For gasoline tanks, throughput is worst case estimate.
(2) For Diesel tanks, emission factors from EPA Tanks Model assuming storage of Diesel fuel.
For gasoline tanks, emission factors from AP-42, Table 4.4-7, 9/85 for tank equipped with Phase I and II systems.

Table A-3-4

Eagle Mountain Landfill and Recycling Center Rail Emissions For Proposed Project With Mitigation						
1. Basic Assumptions	Single Train Capacity (tons of Waste)					3,500
	Desired Daily Capacity (tons of Waste)					18,000
	Average Number of Trains per Day					5.14
2. Emission Factors in pounds per 1,000 gallons	HC	CO	NOx	PM	SO_2	
	14.6	50.0	144.3	8.8	6.7	
3. Fuel and Emission Results for a Single Train						
Trip Segment	Fuel Use Per Train (gallons)	Per train emissions in pounds				
		HC	CO	NOx	PM	SO2
Outbound trip(loaded)						
LACTC to Ferrum	1,955	28.5	97.8	282.1	17.2	13.1
Ferrum to Eagle Mountain	1,208	17.6	60.4	174.3	10.6	8.1
Total outbound trip	3,163	46.2	158.2	456.4	27.8	21.2
Return trip (empty)						
Eagle Mountain to Ferrum	249	3.6	12.5	35.9	2.2	1.7
Ferrum to LACTC	1,139	16.6	57.3	164.4	10.6	7.6
Total inbound trip	1,388	20.3	69.4	200.3	12.2	9.3
Round Trip Total, Single Train	**4,551**	**66.4**	**227.6**	**656.7**	**40.0**	**30.5**
4. Results for Average Operating Day						
Trip Segment	Daily Fuel Use (gallons)	Pounds per day from all trains				
		HC	CO	NOx	PM	SO2
LACTC to Ferrum (SP,loaded)	10,054	147	503	1,451	88	67
Ferrum to Eagle Mountain	6,213	91	311	896	55	12
Total outbound trip	16,267	237	813	2,347	143	109
Return Trip (empty)						
Eagle Mountain to Ferrum	1,281	19	64	185	11	8
Ferrum to LACTC (SP, empty)	5,858	86	293	845	52	39
Total inbound trip	7,138	104	357	1,030	63	48
Totals For Average Day	**23,405**	**342**	**1,170**	**3,377**	**206**	**157**
5. Annual Totals						
	Annual Fuel Use (gallons)	HC Tons per Year	CO Tons per Year	NOx Tons per Year	PM_{10} Tons per Year	SO_2 Tons per Year
Outbound Trip (loaded)						
LACTC to Ferrum	3,669,814	27	92	265	16	12
Ferrum to Eagle Mountain	2,267,589	17	57	164	10	8
Total outbound trip	5,937,403	43	148	428	26	20
Inbound Trip (empty)						
Eagle Mountain to Ferrum	467,409	3	12	34	2	2
Ferrum to LACTC (SP, empty)	2,138,066	16	53	154	9	7
Total inbound trip	2,605,474	19	65	188	11	9
Annual Totals	**8,542,877**	**62**	**214**	**616**	**38**	**29**

Table A-3-5

Mitigated On-site Locomotive Emission Rates

Locomotive Emission Rate (grams per second) Per Locomotive

NOx	CO	PM	VOC	SO2
0.2548	0.1217	0.0125	0.0332	0.0095

Planned Project With Mitigation

	Locomotive Hours		
	Max Hour	Max Day	Annual
Phase I yard	2	22.84	8,338
Phase II yard	2	28.56	10,423

	NOx	CO	PM10	VOC	SO2
Locomotives for one-hour average in grams per second					
Phase I yard	0.510	0.243	0.025	0.066	0.019
Phase II yard	0.510	0.243	0.025	0.066	0.019
Total	1.019	0.487	0.050	0.133	0.038
Locomotives for twenty-four-hour average in grams per second					
Phase I yard	0.243	0.116	0.012	0.032	0.009
Phase II yard	0.303	0.145	0.015	0.040	0.011
Total	0.546	0.261	0.027	0.071	0.020
Locomotives for annual average in grams per second					
Phase I yard	0.243	0.116	0.012	0.032	0.009
Phase II yard	0.303	0.145	0.015	0.040	0.011
Total	0.546	0.261	0.027	0.071	0.020
Locomotives for annual average in units of pounds per day					
Phase I yard	46	22	2	6	2
Phase II yard	58	28	3	8	2
Total	104	50	5	14	4
Locomotives for annual average in units of tons per year					
Phase I yard	8	4	0	1	0
Phase II yard	11	5	1	1	0
Total	19	9	1	2	1

Note: These emission rates apply to the following alternatives:
1. Proposed project
4. Alternate Road
5. Rail Only
7. No Townsite Development

Table A-3-6

Yard Truck Emission Rates with Mitigation

Truck Emission Factors (g/mi) from EMFAC7F

	NOx	CO	PM	VOC	SO2
Basic Emission Factors	18.95	9.10	2.57	1.90	0.52
Speed Correction Factors	1.574	2.661	1.000	1.935	1.000
Emission Factors at 5 mph	29.83	24.22	2.57	3.67	0.52
Grams/second at 5 mph	0.04143	0.03363	0.00357	0.00509	0.00072

Truck Idle Emissions from EPA (at 700 RPM idle with air conditioning)

As reported in grams/hr	223.00	22.00	no data	28.00	3.57
Converted to grams/second	0.06194	0.00611	0.00357	0.00778	0.00099

Total (g/s) for 6 minutes travel at 5 mph and 54 minutes of shutdown per hour

Gram per second emissions	0.00414	0.00336	0.00036	0.00051	0.00007

	Truck Hours		
	Max hour	Max day	year
Phase I	10	100	36,500
Phase II	0	0	0

	NOx	CO	PM10	VOC	SO2
Truck gram per second emissions for one-hour average					
Phase I yard	0.041	0.034	0.004	0.005	0.001
Phase II yard	0.000	0.000	0.000	0.000	0.000
Total	0.041	0.034	0.004	0.005	0.001
Truck gram per second emissions for twenty-four-hour average					
Phase I yard	0.017	0.014	0.001	0.002	0.000
Phase II yard	0.000	0.000	0.000	0.000	0.000
Total	0.017	0.014	0.001	0.002	0.000
Truck gram per second emissions for annual average					
Phase I yard	0.017	0.014	0.001	0.002	0.000
Phase II yard	0.000	0.000	0.000	0.000	0.000
Total	0.017	0.014	0.001	0.002	0.000
Annual Average Truck Emissions in pounds per day					
Phase I yard	3	3	0	0	0
Phase II yard	0	0	0	0	0
Total	3	3	0	0	0

Annual Average Truck Emissions in tons per year

Phase I yard	1	0	0	0	0
Phase II yard	0	0	0	0	0
Total	1	0	0	0	0

These emission rates apply to all mitigated cases where trucks are used. These are:

1. Planned Project
3. Reduced Volume Alternative
4. Alternative Road
6. No Land Exchange
7. No Townsite

Section A-4
Eagle Mountain Landfill And Recycling Center
Emissions Calculations
Reduced Volume Alternative Without Mitigation

Table A-4-1

Eagle Mountain Landfill and Recycling Center
Onsite Mobile Equipment Exhaust Emissions
Reduced Volume Alternative Without Mitigation

	Operating Data				Emission Factors (lb/1000 gal)(1)					Daily Emissions (lbs/day)					Annual Emissions (tons/yr)				
	Number	Hrs/Day	Gals/Hr	Days/Yr	NOx	CO	PM10	VOC	SO2	NOx	CO	PM10	VOC	SO2	NOx	CO	PM10	VOC	SO2
PHASE I INTERMODAL/ TRUCK MARSHALING YARD																			
Overhead Crane	4	20	7	365	226.65	39.13	12.99	11.74	7.10	123.40	21.30	7.07	6.39	3.87	22.52	3.89	1.29	1.17	0.71
Rubber-Tired Loader	1	10	2.6	365	226.65	39.13	12.99	11.74	7.10	5.67	0.98	0.32	0.29	0.18	1.03	0.18	0.06	0.05	0.03
PHASE II INTERMODAL YARD																			
Overhead Crane	4	20	7	365	226.65	39.13	12.99	11.74	7.10	123.40	21.30	7.07	6.39	3.87	22.62	3.89	1.29	1.17	0.71
WASTE HAULING FROM PHASE I INTERMODAL YARD																			
Hostling Vehicle	21	10	7	365	226.65	39.13	12.99	11.74	7.10	330.00	56.98	18.92	17.09	10.34	60.23	10.40	3.45	3.12	1.89
WASTE HAULING FROM PHASE II INTERMODAL YARD																			
Hostling Vehicle	22	10	7	365	226.65	39.13	12.99	11.74	7.10	342.69	69.17	19.64	17.75	10.74	62.54	10.80	3.58	3.24	1.96
LANDFILL FACE																			
Crawler Tractor	10	10	13	365	226.65	39.13	12.99	11.74	7.10	282.86	48.84	18.21	14.65	8.86	61.62	8.91	2.96	2.67	1.62
Refuse Compactor	10	10	14	365	226.65	39.13	12.99	11.74	7.10	304.62	52.59	17.46	15.78	9.54	55.59	9.60	3.19	2.88	1.74
DAILY COVER EXCAVATION, HAULING AND SPREADING																			
Rubber-Tired Loader	2	10	12	365	226.65	39.13	12.99	11.74	7.10	43.52	7.61	2.49	2.25	1.36	7.94	1.37	0.46	0.41	0.25
Haul Truck	8	10	9.6	365	226.65	39.13	12.99	11.74	7.10	172.25	29.74	9.87	8.92	6.40	31.44	6.43	1.80	1.63	0.98
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
DUST CONTROL AND ROAD MAINTENANCE																			
Water Tanker	8	10	11	365	226.65	39.13	12.99	11.74	7.10	139.62	24.10	8.00	7.23	4.37	26.48	4.40	1.46	1.32	0.80
Motor Grader	2	10	6	365	226.65	39.13	12.99	11.74	7.10	32.64	6.63	1.87	1.69	1.02	6.96	1.03	0.34	0.31	0.19
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
Vacuum Sweeper	2	10	11	365	226.65	39.13	12.99	11.74	7.10	49.86	8.81	2.86	2.58	1.56	9.10	1.57	0.52	0.47	0.29
FINAL COVER EXCAVATION, HAULING AND SPREADING																			
Rubber-Tired Loader	1	10	7	365	226.65	39.13	12.99	11.74	7.10	15.87	2.74	0.91	0.82	0.50	2.90	0.50	0.17	0.16	0.09
Haul Truck	2	10	8	365	226.65	39.13	12.99	11.74	7.10	32.64	6.63	1.87	1.69	1.02	6.96	1.03	0.34	0.31	0.19
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.62	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
Compactor	1	10	10.6	365	226.65	39.13	12.99	11.74	7.10	23.80	4.11	1.36	1.23	0.76	4.34	0.76	0.25	0.22	0.14
LINER CONSTRUCTION CLAY MATERIAL																			
Frontend Loader	1	10	7	365	226.65	39.13	12.99	11.74	7.10	15.87	2.74	0.91	0.82	0.50	2.90	0.50	0.17	0.15	0.09
Haul Truck	1	10	6	365	226.65	39.13	12.99	11.74	7.10	13.60	2.35	0.78	0.70	0.43	2.48	0.43	0.14	0.13	0.08
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.62	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
Compactor	1	10	10.6	365	226.65	39.13	12.99	11.74	7.10	23.80	4.11	1.36	1.23	0.75	4.34	0.75	0.25	0.22	0.14
LINER CONSTRUCTION AGGREGATE MATERIAL																			
Frontend Loader	2	10	12	365	226.65	39.13	12.99	11.74	7.10	43.52	7.61	2.49	2.25	1.36	7.94	1.37	0.46	0.41	0.25
Haul Truck	7	10	9.6	365	226.65	39.13	12.99	11.74	7.10	155.03	26.77	8.89	8.03	4.86	28.29	4.88	1.62	1.47	0.89
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
Compactor	1	10	10.5	365	226.65	39.13	12.99	11.74	7.10	23.80	4.11	1.36	1.23	0.75	4.34	0.76	0.25	0.22	0.14
BENCH CLEARING																			
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
MISCELLANEOUS																			
Backhoe	2	10	2.6	365	226.65	39.13	12.99	11.74	7.10	11.33	1.96	0.65	0.59	0.36	2.07	0.36	0.12	0.11	0.06
Utility Truck	2	10	5	365	226.65	39.13	12.99	11.74	7.10	27.20	4.70	1.56	1.41	0.85	4.96	0.86	0.28	0.26	0.16
Grader	1	10	8	365	226.65	39.13	12.99	11.74	7.10	13.60	2.35	0.78	0.70	0.43	2.48	0.43	0.14	0.13	0.08
									TOTAL =	2,472.9	427.0	141.8	128.1	77.6	451.3	77.9	25.9	23.4	14.1

Footnote:
(1) NOx, CO, HC, and PM emission factors based on use of off-road engines meeting EPA's 1996 standards with manufacturers able to certify engines below standards by typical margins (i.e., 93% of NOx standard, 12% of CO standard, and 26% of HC standard based on results of 1993 EPA certification tests for on-road heavy-duty Diesel engines, 83% of PM standard based on EPA'e PART6 model). SOx emissions based on use of low sulfur fuel meeting CARB's 1993 standards.

Eagle Mountain Landfill and Recycling Center
Fugitive Dust Emissions
Reduced Volume Alternative Without Mitigation

Activity	Operating Data: Daily Process Rate	Units	Annual Operation (days/yr)	TSP Emissions: Emission Factor(1) (lbs/unit)	Control Factor(2) (%)	Emission Rate (lbs/day)	PM10 Emissions: PM10 Conversion Factor(3)	Emission Rate (lbs/day)	Emission Rate (tons/yr)
Waste Hauling (From Phase I Yard)	608	vmt	365	3.87	95%	117.6	0.45	52.9	9.7
Waste Hauling (From Phase II Yard)	2003	vmt	365	3.87	95%	387.4	0.45	174.3	31.8
Daily Cover Excavation	16	hr	365	5.70	90%	9.1	0.13	1.2	0.2
Daily Cover Truck Loading	7516.8	ton	365	0.01	0%	90.8	0.47	42.9	7.8
Daily Cover Hauling	156	vmt	365	5.63	95%	44.0	0.45	19.8	3.6
Daily Cover Dumping	7516.8	ton	365	0.01	0%	90.8	0.47	42.9	7.8
Daily Cover Spreading	10	hr	365	5.70	0%	57.0	0.13	7.5	1.4
Final Cover Excavation	10	hr	365	5.70	90%	5.7	0.13	0.8	0.1
Final Cover Truck Loading	1159	ton	365	0.01	0%	14.0	0.47	6.6	1.2
Final Cover Hauling	88	vmt	365	3.87	95%	17.0	0.45	7.7	1.4
Final Cover Dumping	1159	ton	365	0.01	0%	14.0	0.47	6.6	1.2
Final Cover Spreading	10	hr	365	5.70	0%	57.0	0.13	7.5	1.4
Liner Material Hauling (Clay)	49	vmt	365	3.87	95%	9.5	0.45	4.3	0.8
Liner Material Excavation (Rock)	16	hr	365	5.70	90%	9.1	0.13	1.2	0.2
Liner Material Truck Loading (Rock)	6453	ton	365	0.00	0%	3.9	0.47	1.8	0.3
Liner Material Hauling (Rock)	165	vmt	365	5.63	95%	46.5	0.45	20.9	3.8
Liner Material Dumping (Rock)	6453	ton	365	0.00	0%	3.9	0.47	1.8	0.3
Liner Material Spreading (Rock)	10	hr	365	7.04	0%	70.4	0.13	9.3	1.7
Road Watering	392	vmt	365	1.31	95%	25.7	0.45	11.6	2.1
Paved Road Vacuuming	100	vmt	365	1.17	95%	5.8	0.20	1.1	0.2
Road Grading	48	vmt	365	0.23	60%	4.3	0.54	2.4	0.4
Road Blading	10	hr	365	4.36	0%	43.6	0.13	5.7	1.0
Bench Clearing	10	hr	365	5.70	30%	39.9	0.16	6.5	1.2
Backhoe	20	hr	365	0.04	30%	0.6	0.77	0.4	0.1
Utility Truck Travel	120	vmt	365	0.26	95%	1.5	0.45	0.7	0.1
Grader	20	vmt	365	0.23	60%	1.8	0.54	1.0	0.2
Windblown Dust (Unpaved Haul Roads)	890,419	sq.ft.	365	0.00001	0%	10.3	0.50	5.1	0.9
Windblown Dust (Daily Cover)	87,000	sq.ft.	365	0.00001	0%	1.0	0.50	0.5	0.1
Windblown Dust (Final Cover)	21,750	sq.ft.	365	0.00001	0%	0.3	0.50	0.1	0.0
Windblown Dust (Daily Cover Borrow Area)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Final Cover Borrow Area)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Liner Borrow Area- Rock)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Phase 1 Yard)	870,000	sq.ft.	365	0.00001	0%	10.0	0.50	5.0	0.9
Windblown Dust (Phase 2 Yard)	217,500	sq.ft.	365	0.00001	0%	2.5	0.50	1.3	0.2
Windblown Dust (Liner-Rock)	21,750	sq.ft.	365	0.00001	0%	0.3	0.50	0.1	0.0
Material Crushing Plant	246	ton	365	0.05	99%	0.2	0.88	0.1	0.0
Material Screening Plant	14,883	ton	365	0.04	99%	7.4	0.84	6.2	1.1
					TOTAL =	1203.3		458.2	83.6

Note: See notes on following page.

Footnotes (Fugitive Dust Emissions):

1.a. Waste Hauling: TSP emission factor is computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using a surface silt of 1.7%, vehicle speed of 30 mph, 6 wheels, 20 days precipitation, and an average vehicle weight of 30 tons. The silt content is from a 9/26/79 sieve analysis of the coarse tailing pile.

b. Daily Cover, Final Cover, Liner-Rock Excavation: TSP emission factor is from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95, for 1% silt, 1% moisture content. The silt and moisture contents are an estimate for low silt /dry material.

c. Road bulldozing: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95, for 1.7% silt, 2% moisture content. The silt content is from a 9/26/79 sieve analysis of the coarse tailing pile and the moisture content is an estimate for dry material.

d. Material Crushing Plant: TSP emission factor is calculated as the sum of emission factors for the process - 0.0003 lbs/ton dump hopper, 0.00294 lbs/ton for belt transfer, 0.005 lbs/ton for primary, secondary, and tertiary crushers, 0.0315 lbs/ton for screens, 0.00294 lbs/ton for stacker (AP-42, Table 11.19.2-2, 1/95).

e. Material Screening Plant: TSP emission factor is calculated as the sum of emission factors for the process - 0.0003 lbs/ton dump hopper, 0.00294 lbs/ton for belt transfer, 0.0315 lbs/ton for screens, 0.00294 lbs/ton for stacker (AP-42, Table 11.19.2-2, 1/95).

f. Daily Cover, Final Cover Truck Loading/Dumping: TSP emission factor from AP-42, Section 13.2.4-3, 1/95, using 8.3 mph wind and 1% moisture content. The average wind speed is from data collected by an onsite monitoring station while the moisture content is an estimate for dry material.

g. Liner-Rock Truck Loading/Dumping: TSP emission factor from AP-42, Section 13.2.4-3, 1/95, using 8.3 mph wind and 8.5% moisture content. The average wind speed is from data collected onsite and the moisture content is from Section 7.6 of the Report of Waste Discharge (ROWD), 1992, GeoSyntec.

h. Daily Cover and Final Cover Hauling: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 30 mph, 4 wheels, 20 days precipitation, and an average vehicle weight of 68.5 tons.

i. Daily Cover, Final Cover Spreading: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 1% silt, 1% moisture content. Silt and moisture contents are an estimate for low silt dry material.

j. Liner-Rock Spreading: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 12.2% silt, 8.5% moisture content. Silt and moisture contents from Section 7.6 of the Report of Waste Discharge (ROWD), 1992, GeoSyntec.

k. Road Watering: TSP emission factor computed from AP-42, Section 13.2.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 7 mph, 4 wheels, 20 days of precipitation, and an average vehicle weight of 68.5 tons.

l. Road Grading: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 2 mph.

m. Final Cover, Liner-Clay Hauling: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 30 mph, 6 wheels, 20 days of precipitation, and an average vehicle weight of 30 tons.

n. Bench Clearing: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 1% silt, 1% moisture content. The silt and moisture contents are an estimate for dry material.

o. Backhoe: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 1 mph.

p. Utility Truck: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 5 mph, 6 wheels, 20 days of precipitation, and an average vehicle weight of 8 tons.

q. Grader: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 2 mph.

r. Vacuum Sweeper: TSP emission factor computed from AP-42, Section 13.2.1 (Paved Roads), 1/95, using surface silt loading of 7.4 g/m^2 , and an average vehicle weight of 10 tons.

s. Wind Erosion: TSP emission factor computed from "Control of Open Fugitive Dust Sources", EPA-450/3-88-008, 9/88, using material size mode of 7.0 mm from 9/26/79 sieve analyses of coarse tailing pile, threshold friction velocity of 1.5 m/sec from Figure 6-1 of EPA document, roughness height of 0.1 m from Figure 6-4 of EPA document, and onsite wind data.

2.a. Waste, Daily Cover, Final Cover, Liner-Rock/Clay Hauling, Road Watering, Utility Truck: TSP control factor based on watering and/or application of chemical dust suppressant (see Bureau of Mines - United States Department of the Interior "Cost Effectiveness of Dust Controls Used On Unpaved Haul Roads", December 1983).

b. Daily Cover, Final Cover, Liner-Rock Excavation: TSP control factor is estimated from field data collected during the excavation of tailings at a former asbestos mine near Copperopolis, California.

c. Material Processing: TSP control factor is a composite weighted by emissions from each process: 80% control for dump hopper (from vendor literature and inspection of hoppers equipped with hollow cone spray nozzles), 99% control for belt transfers, screens, and crushers (estimated from vendor literature for pulse-jet dust collectors), 95% control for pile stacker (estimated from vendor literature and inspection of stackers with drop height controllers, midbelt deluge sprays, and head pulley solid cone nozzles).

d. Vacuum Sweeping: TSP control factor from AP-42, Section 13.2.1-1 (Paved Roads), 1/95, assuming water flushing of paved road surfaces reduces surface silt loading from 7.4 to 0.082 g/m2.

e. Road Grading: Same as TSP control factor used for road watering.

f. Bench Clearing: TSP control factor based on inspection of mining projects with heavy equipment operation and use of water for dust control.

g. Backhoe: TSP control factor based on inspection of pipeline construction projects with backhoe operation and use of water for dust control.

h. Grader: same as TSP control factor used for road watering.

3.a. Waste, Liner-Rock/Clay, Daily Cover, Final Cover Hauling, Utility Truck, Road Watering: PM10 conversion factor from AP-42, Section 13.2.2, 1/95.

b. Daily Cover, Final Cover, Liner-Rock Excavation: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

c. Material Processing: PM10 conversion factor is an emission-weighted average covering each item of operation - 50% dump hopper (AP-42, Table 11.24-2, 1/95), 100% for belt transfers, screens, crushers (all emissions from dust collectors assumed to be PM10), 50% pile stacker (AP-42, Table 11.24-2, 1/95).

d. Truck Loading: PM10 conversion factor from AP-42, Section 13.2.4-3, 1/95.

e. Truck Dumping: PM10 conversion factor from AP-42, Section 13.2.4-3, 1/95.

f. Daily Cover, Final Cover, Liner-Rock Spreading: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

g. Road Grading: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

h. Bench Clearing: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

I. Backhoe: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

j. Vacuum Sweeper: PM10 conversion factor from AP-42, Section 13.2.1-1, 1/95.

k. Wind Erosion: PM10 conversion factor from "Control of Open Fugitive Dust Sources", EPA-450/3-88-008, 9/88.

l. Grader: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

Table A-4-3

Eagle Mountain Landfill and Recycling Center Rail Emissions For Reduced Volume Alternative Without Mitigation						
1. Basic Assumptions	Single Train Capacity (tons of Waste)					3,500
	Desired Daily Capacity (tons of Waste)					14,000
	Average Number of Trains per Day					4
2. Emission Factors in pounds per 1,000 gallons		HC	CO	NOx	PM	SO_2
		22.5	71.5	502.5	11.3	38.0
3. Fuel and Emission Results for a Single Train						
Trip Segment	Fuel Use Per Train (gallons)	Per train emissions in pounds				
		HC	CO	NOx	PM	SO2
Outbound trip(loaded)						
LACTC to Ferrum	1,955	44.0	139.8	982.4	22.1	74.3
Ferrum to Eagle Mountain	1,208	27.2	86.4	607.0	13.7	45.9
Total outbound trip	3,163	71.2	226.2	1,589.4	35.7	120.2
Return trip (empty)						
Eagle Mountain to Ferrum	249	5.6	17.8	125.1	2.8	9.5
Ferrum to LACTC	1,139	25.6	81.4	572.3	12.9	43.3
Total inbound trip	1,388	31.2	99.2	697.5	15.7	52.7
Round Trip Total, Single Train	**4,551**	**102.4**	**325.4**	**2,286.9**	**51.4**	**172.9**
4. Results for Average Operating Day						
Trip Segment	Daily Fuel Use (gallons)	Pounds per day from all trains				
		HC	CO	NOx	PM	SO2
LACTC to Ferrum (SP,loaded)	7,820	176	559	3,930	88	297
Ferrum to Eagle Mountain	4,832	109	345	2,428	55	184
Total outbound trip	12,652	285	905	6,358	143	481
Return Trip (empty)						
Eagle Mountain to Ferrum	996	22	71	500	11	34
Ferrum to LACTC (SP, empty)	4,556	103	326	2,289	51	173
Total inbound trip	5,552	125	397	2,790	63	211
Totals For Average Day	**18,204**	**410**	**1,302**	**9,148**	**206**	**692**
5. Annual Totals						
	Annual Fuel Use (gallons)	HC Tons per Year	CO Tons per Year	NOx Tons per Year	PM_{10} Tons per Year	SO_2 Tons per Year
Outbound Trip (loaded)						
LACTC to Ferrum	2,854,300	32	102	717	16	54
Ferrum to Eagle Mountain	1,763,680	20	63	443	10	34
Total outbound trip	4,617,980	52	165	1,160	26	88
Inbound Trip (empty)						
Eagle Mountain to Ferrum	363,540	4	13	91	2	7
Ferrum to LACTC (SP, empty)	1,662,940	19	59	418	9	32
Total inbound trip	2,026,480	23	72	509	11	39
Annual Totals	**6,644,460**	**75**	**238**	**1,669**	**38**	**126**

Table A-4-4

On-site Locomotive Emission Rates

Locomotive Emission Rate (grams per second) Per Locomotive

NOx	CO	PM	VOC	SO2
0.5392	0.2202	0.0161	0.0948	0.0591

Reduced Volume Alternative Without Mitigation

	Locomotive Hours		
	Max Hour	Max Day	Annual
Phase I yard	2	17.78	6,489
Phase II yard	2	22.22	8,111

	NOx	CO	PM10	VOC	SO2
Locomotives for one-hour average in grams per second					
Phase I yard	1.078	0.440	0.032	0.190	0.118
Phase II yard	1.078	0.440	0.032	0.190	0.118
Total	2.157	0.881	0.064	0.379	0.236
Locomotives for twenty-four-hour average in grams per second					
Phase I yard	0.399	0.163	0.012	0.070	0.044
Phase II yard	0.499	0.204	0.015	0.088	0.055
Total	0.899	0.367	0.027	0.158	0.098
Locomotives for annual average in grams per second					
Phase I yard	0.399	0.163	0.012	0.070	0.044
Phase II yard	0.499	0.204	0.015	0.088	0.055
Total	0.899	0.367	0.027	0.158	0.098
Locomotives for annual average in units of pounds per day					
Phase I yard	76	31	2	13	8
Phase II yard	95	39	3	17	10
Total	171	70	5	30	19
Locomotives for annual average in units of tons per year					
Phase I yard	14	6	0	2	2
Phase II yard	17	7	1	3	2
Total	31	13	1	5	3

Note: These emission rates apply to the following alternatives:
3. Reduced Volume
6. No Land Exchange

Table A-4-5

Eagle Mountain Landfill and Recycling Center
Reduced Volume Alternative
Flare Station Emissions

Information Source	Emission Factors (lbs/MMBtu) NOx	CO	PM10	VOC	SOx
SCAQMD BACT (1)	0.060	N/A	N/A	N/A	N/A
SCAQMD Test Data (2)				0.022	
SCAQMD Rule 431.1 (3)					0.014
Vendor Data (4)	0.054	0.270	0.024	N/A	N/A
Puente Hills (5)	0.083	0.068	N/A	0.080	0.011
BKK (5)	0.013	0.482	0.028	0.022	0.005
Milliken (6)	0.141	0.132	N/A	0.136	N/A
Best Estimate	0.054	0.27	0.024	0.022	0.014

Maximum Landfill Gas Production Rate =	36800	scfm
	52.99	MMscf/day
Landfill Gas Heat Content (HHV) =	505	BTU/scf
Maximum Heat Input =	1115	MMBTU/hr

	NOx	CO	PM10	VOC	SOx
Emission Factors (lb/MMBTU)	0.054	0.270	0.024	0.022	0.014
Control Efficiency (7):	30%	90%	N/A	50%	N/A
Emissions					
(lb/hr)	42.1	30.1	26.8	12.3	15.6
(lb/day)	1011.6	722.5	642.3	294.4	374.7
(tons/yr)	184.6	131.9	117.2	53.7	68.4
Emissions Per Flare (g/sec)	0.66	0.47	0.42	0.19	0.25

Footnotes:
(1) From South Coast AQMD Best Available Control Technology Guidelines, January 1990.
(2) From a collection of test data compiled by the South Coast AQMD for Prima, Santiago, El Sobrante, Chiquita, and Puente Hills landfills showing NMHC contents of raw landfill gas. VOC emission factor based on raw landfill NMHC content of 13,410 ppmv and vendor guaranteed NMHC flare destruction efficiency of 98%.
(3) Based on raw landfill gas sulfur content of 40 ppmv as limited by South Coast AQMD Rule 431.1 (as amended October 2, 1992).
(4) Manufacturer's guarantee.
(5) California Air Resources Board source test, July 1986.
(6) South Coast AQMD source test, July 1988.
(7) Reflects use of urea injection (or equivalent) for NOx control, oxidation catalyst for CO and VOC control.

Section A-5
Eagle Mountain Landfill And Recycling Center
Emissions Calculations
Reduced Volume Alternative With Mitigation

Table A-5-1

Eagle Mountain Landfill and Recycling Center
Onsite Mobile Equipment Exhaust Emissions
Reduced Volume Alternative With Mitigation

	Number	Operating Data Hrs/Day	Gals/Hr	Days/Yr	Emission Factors (lb/1000 gal)(1) NOx	CO	PM10	VOC	SO2	Daily Emissions (lbs/day) NOx	CO	PM10	VOC	SO2	Annual Emissions (tons/yr) NOx	CO	PM10	VOC	SO2
PHASE I INTERMODAL TRUCK MARSHALING YARD																			
Overhead Crane	4	20	7	365	125.22	39.13	12.99	11.74	7.10	68.18	21.30	7.07	6.39	3.87	12.44	3.89	1.29	1.17	0.71
Rubber-Tired Loader	1	10	2.5	365	125.22	39.13	12.99	11.74	7.10	2.50	0.78	0.26	0.23	0.14	0.46	0.14	0.05	0.04	0.03
PHASE II INTERMODAL YARD																			
Overhead Crane	4	20	7	365	125.22	39.13	12.99	11.74	7.10	68.18	21.30	7.07	6.39	3.87	12.44	3.89	1.29	1.17	0.71
WASTE HAULING FROM PHASE I INTERMODAL YARD																			
Hostling Vehicle	21	10	7	365	62.61	74.35	3.25	11.74	7.10	91.16	108.25	4.73	17.09	10.34	16.64	19.76	0.86	3.12	1.89
WASTE HAULING FROM PHASE II INTERMODAL YARD																			
Hostling Vehicle	22	10	7	365	62.61	74.35	3.25	11.74	7.10	94.87	112.42	4.91	17.75	10.74	17.26	20.52	0.90	3.24	1.96
LANDFILL FACE																			
Crawler Tractor	10	10	13	365	125.22	39.13	12.99	11.74	7.10	156.28	48.84	16.21	14.65	8.86	28.52	8.91	2.96	2.67	1.62
Refuse Compactor	10	10	14	365	125.22	39.13	12.99	11.74	7.10	168.30	52.59	17.46	15.78	9.54	30.71	9.60	3.19	2.88	1.74
DAILY COVER EXCAVATION, HAULING AND SPREADING																			
Rubber-Tired Loader	2	10	12	365	125.22	39.13	12.99	11.74	7.10	24.04	7.51	2.49	2.25	1.36	4.39	1.37	0.46	0.41	0.25
Haul Truck	2	10	9.5	365	62.61	74.35	3.25	11.74	7.10	14.28	16.95	0.74	2.68	1.62	2.61	3.09	0.14	0.49	0.30
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
DUST CONTROL AND ROAD MAINTENANCE																			
Water Tanker	6	10	11	365	62.61	74.35	3.25	11.74	7.10	38.57	45.80	2.00	7.23	4.37	7.04	8.36	0.37	1.32	0.80
Motor Grader	2	10	6	365	125.22	39.13	12.99	11.74	7.10	18.03	5.63	1.87	1.69	1.02	3.29	1.03	0.34	0.31	0.19
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
Vacuum Sweeper	2	10	11	365	62.61	74.35	3.25	11.74	7.10	11.02	13.09	0.57	2.07	1.25	2.01	2.39	0.10	0.38	0.23
FINAL COVER EXCAVATION, HAULING AND SPREADING																			
Rubber-Tired Loader	1	10	7	365	125.22	39.13	12.99	11.74	7.10	8.77	2.74	0.91	0.82	0.50	1.60	0.50	0.17	0.15	0.09
Haul Truck	1	10	6	365	62.61	74.35	3.25	11.74	7.10	3.76	4.48	0.19	0.70	0.43	0.69	0.81	0.04	0.13	0.08
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
Compactor	1	10	10.5	365	125.22	39.13	12.99	11.74	7.10	13.15	4.11	1.36	1.23	0.75	2.40	0.75	0.25	0.22	0.14
LINER CONSTRUCTION CLAY MATERIAL																			
Frontend Loader	1	10	7	365	125.22	39.13	12.99	11.74	7.10	8.77	2.74	0.91	0.82	0.50	1.60	0.50	0.17	0.15	0.09
Haul Truck	1	10	6	365	62.61	74.35	3.25	11.74	7.10	3.76	4.48	0.19	0.70	0.43	0.69	0.81	0.04	0.13	0.08
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
Compactor	1	10	10.5	365	125.22	39.13	12.99	11.74	7.10	13.15	4.11	1.36	1.23	0.75	2.40	0.75	0.25	0.22	0.14
LINER CONSTRUCTION AGGREGATE MATERIAL																			
Frontend Loader	2	10	12	365	125.22	39.13	12.99	11.74	7.10	24.04	7.51	2.49	2.25	1.36	4.39	1.37	0.46	0.41	0.25
Haul Truck	2	10	9.5	365	62.61	74.35	3.25	11.74	7.10	14.28	16.95	0.74	2.68	1.62	2.61	3.09	0.14	0.49	0.30
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
Compactor	1	10	10.5	365	125.22	39.13	12.99	11.74	7.10	13.15	4.11	1.36	1.23	0.75	2.40	0.75	0.25	0.22	0.14
BENCH CLEARING																			
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
MISCELLANEOUS																			
Backhoe	2	10	2.5	365	125.22	39.13	12.99	11.74	7.10	5.01	1.57	0.52	0.47	0.28	0.91	0.29	0.09	0.09	0.05
Utility Truck	2	10	5	365	62.61	74.35	3.25	11.74	7.10	7.51	8.92	0.39	1.41	0.85	1.37	1.63	0.07	0.28	0.16
Grader	1	10	8	365	125.22	39.13	12.99	11.74	7.10	7.51	2.35	0.78	0.70	0.43	1.37	0.43	0.14	0.13	0.08
									TOTAL =	945.7	539.8	83.8	114.8	69.4	172.6	98.5	15.3	21.0	12.7

Footnote:
(1) For haul trucks, water trucks, and hostling vehicles, CO, PM10, and HC emission factors based on use of on-road engines meeting EPA's 1998 standards with manufacturers able to certify engines below standards by typical margins (i.e., 12% of CO standard and 26% of HC standard based on results of 1993 EPA certification tests for on-roed heavy-duty Diesel engines, 83% of PM standard based on EPA PART5 model).
NOx emission factor based on use of on-road engines meeting standards discussed in EPA's notice of proposed rulemaking for heavy-duty on-road engines (60 FR 45580) with manufacturers able to certify engines below standards by typical margins (i.e., 80% of NOx standard based on EPA Mobile5e model) . SOx emission factors based on use of low sulfur fuel meeting CARB's 1993 standards.

For bulldozers, loaders, scrappers, and crawler tractors, CO, HC, and PM emission factors based on use of off-road engines meeting EPA's 1996 standards with manufacturers able to certify engines below standards by typical margins (i.e., 12% of CO standard and 26% of HC standard based on results of 1993 EPA certification tests for on-roed heavy-duty Diesel engines, 83% of PM standard based on EPA PART5 model).
NOx emission factor based on use of off-road engines meeting levels expected in future EPA rulemaking for off-road Diesel engines with manufacturers able to certify engines below standards by typical margins (i.e., 80% of NOx standard based on EPA Mobile5e model) . SOx emission factors based on use of low sulfur fuel meeting CARB's 1993 standards.

Table A-5-2

Eagle Mountain Landfill and Recycling Center
Fugitive Dust Emissions
Reduced Volume Alternative With Mitigation

Activity	Operating Data: Daily Process Rate	Units	Annual Operation (days/yr)	TSP Emissions: Emission Factor(1) (lbs/unit)	Control Factor(2) (%)	Emission Rate (lbs/day)	PM10 Emissions: PM10 Conversion Factor(3)	Emission Rate (lbs/day)	Emission Rate (tons/yr)
Waste Hauling (From Phase I Yard)	608	vmt	365	3.87	95%	117.6	0.45	52.9	9.7
Waste Hauling (From Phase II Yard)	2003	vmt	365	3.87	95%	387.4	0.45	174.3	31.8
Daily Cover Excavation	16	hr	365	5.70	90%	9.1	0.13	1.2	0.2
Daily Cover Truck Loading	7516.8	ton	365	0.01	0%	90.8	0.47	42.9	7.8
Daily Cover Hauling	156	vmt	365	5.63	95%	44.0	0.45	19.8	3.6
Daily Cover Dumping	7516.8	ton	365	0.01	0%	90.8	0.47	42.9	7.8
Daily Cover Spreading	10	hr	365	5.70	0%	57.0	0.13	7.5	1.4
Final Cover Excavation	10	hr	365	5.70	90%	5.7	0.13	0.8	0.1
Final Cover Truck Loading	1159	ton	365	0.01	0%	14.0	0.47	6.6	1.2
Final Cover Hauling	88	vmt	365	3.87	95%	17.0	0.45	7.7	1.4
Final Cover Dumping	1159	ton	365	0.01	0%	14.0	0.47	6.6	1.2
Final Cover Spreading	10	hr	365	5.70	0%	57.0	0.13	7.5	1.4
Liner Material Hauling (Clay)	49	vmt	365	3.87	95%	9.5	0.45	4.3	0.8
Liner Material Excavation (Rock)	16	hr	365	5.70	90%	9.1	0.13	1.2	0.2
Liner Material Truck Loading (Rock)	6453	ton	365	0.00	0%	3.9	0.47	1.8	0.3
Liner Material Hauling (Rock)	165	vmt	365	5.63	95%	46.5	0.45	20.9	3.8
Liner Material Dumping (Rock)	6453	ton	365	0.00	0%	3.9	0.47	1.8	0.3
Liner Material Spreading (Rock)	10	hr	365	7.04	0%	70.4	0.13	9.3	1.7
Road Watering	392	vmt	365	1.31	95%	25.7	0.45	11.6	2.1
Paved Road Vacuuming	80	vmt	365	1.17	95%	4.7	0.20	0.9	0.2
Road Grading	48	vmt	365	0.23	60%	4.3	0.54	2.4	0.4
Road Blading	10	hr	365	4.36	0%	43.6	0.13	5.7	1.0
Bench Clearing	10	hr	365	5.70	30%	39.9	0.16	6.5	1.2
Backhoe	16	hr	365	0.04	30%	0.4	0.77	0.3	0.1
Utility Truck Travel	120	vmt	365	0.26	95%	1.5	0.45	0.7	0.1
Grader	20	vmt	365	0.23	60%	1.8	0.54	1.0	0.2
Windblown Dust (Unpaved Haul Roads)	890,419	sq.ft.	365	0.00001	0%	10.3	0.50	5.1	0.9
Windblown Dust (Daily Cover)	87,000	sq.ft.	365	0.00001	0%	1.0	0.50	0.5	0.1
Windblown Dust (Final Cover)	21,750	sq.ft.	365	0.00001	0%	0.3	0.50	0.1	0.0
Windblown Dust (Daily Cover Borrow Area)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Final Cover Borrow Area)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Liner Borrow Area- Rock)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Phase 1 Yard)	870,000	sq.ft.	365	0.00001	0%	10.0	0.50	5.0	0.9
Windblown Dust (Phase 2 Yard)	217,500	sq.ft.	365	0.00001	0%	2.5	0.50	1.3	0.2
Windblown Dust (Liner-Rock)	21,750	sq.ft.	365	0.00001	0%	0.3	0.50	0.1	0.0
Material Crushing Plant	246	ton	365	0.05	99%	0.2	0.88	0.1	0.0
Material Screening Plant	14,883	ton	365	0.04	99%	7.4	0.84	6.2	1.1
					TOTAL =	1202.0		457.9	83.6

Note: See notes on following page.

Footnotes (Fugitive Dust Emissions):

1.a. Waste Hauling: TSP emission factor is computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using a surface silt of 1.7%, vehicle speed of 30 mph, 6 wheels, 20 days precipitation, and an average vehicle weight of 30 tons. The silt content is from a 9/26/79 sieve analysis of the coarse tailing pile.

b. Daily Cover, Final Cover, Liner-Rock Excavation: TSP emission factor is from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95, for 1% silt, 1% moisture content. The silt and moisture contents are an estimate for low silt /dry material.

c. Road bulldozing: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95, for 1.7% silt, 2% moisture content. The silt content is from a 9/26/79 sieve analysis of the coarse tailing pile and the moisture content is an estimate for dry material.

d. Material Crushing Plant: TSP emission factor is calculated as the sum of emission factors for the process - 0.0003 lbs/ton dump hopper, 0.00294 lbs/ton for belt transfer, 0.005 lbs/ton for primary, secondary, and tertiary crushers, 0.0315 lbs/ton for screens, 0.00294 lbs/ton for stacker (AP-42, Table 11.19.2-2, 1/95).

e. Material Screening Plant: TSP emission factor is calculated as the sum of emission factors for the process - 0.0003 lbs/ton dump hopper, 0.00294 lbs/ton for belt transfer, 0.0315 lbs/ton for screens, 0.00294 lbs/ton for stacker (AP-42, Table 11.19.2-2, 1/95).

f. Daily Cover, Final Cover Truck Loading/Dumping: TSP emission factor from AP-42, Section 13.2.4-3, 1/95, using 8.3 mph wind and 1% moisture content. The average wind speed is from data collected by an onsite monitoring station while the moisture content is an estimate for dry material.

g. Liner-Rock Truck Loading/Dumping: TSP emission factor from AP-42, Section 13.2.4-3, 1/95, using 8.3 mph wind and 8.5% moisture content. The average wind speed is from data collected onsite and the moisture content is from Section 7.6 of the Report of Waste Discharge (ROWD), 1992, GeoSyntec.

h. Daily Cover and Final Cover Hauling: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 30 mph, 4 wheels, 20 days precipitation, and an average vehicle weight of 68.5 tons.

i. Daily Cover, Final Cover Spreading: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 1% silt, 1% moisture content. Silt and moisture contents are an estimate for low silt dry material.

j. Liner-Rock Spreading: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 12.2% silt, 8.5% moisture content. Silt and moisture contents from Section 7.6 of the Report of Waste Discharge (ROWD), 1992, GeoSyntec.

k. Road Watering: TSP emission factor computed from AP-42, Section 13.2.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 7 mph, 4 wheels, 20 days of precipitation, and an average vehicle weight of 68.5 tons.

l. Road Grading: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 2 mph.

m. Final Cover, Liner-Clay Hauling: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 30 mph, 6 wheels, 20 days of precipitation, and an average vehicle weight of 30 tons.

n. Bench Clearing: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 1% silt, 1% moisture content. The silt and moisture contents are an estimate for dry material.

o. Backhoe: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 1 mph.

p. Utility Truck: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 5 mph, 6 wheels, 20 days of precipitation, and an average vehicle weight of 8 tons.

q. Grader: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 2 mph.

r. Vacuum Sweeper: TSP emission factor computed from AP-42, Section 13.2.1 (Paved Roads), 1/95, using surface silt loading of 7.4 g/m^2 , and an average vehicle weight of 10 tons.

s. Wind Erosion: TSP emission factor computed from "Control of Open Fugitive Dust Sources", EPA-450/3-88-008, 9/88, using material size mode of 7.0 mm from 9/26/79 sieve analyses of coarse tailing pile, threshold friction velocity of 1.5 m/sec from Figure 6-1 of EPA document, roughness height of 0.1 m from Figure 6-4 of EPA document, and onsite wind data.

2.a. Waste, Daily Cover, Final Cover, Liner-Rock/Clay Hauling, Road Watering, Utility Truck: TSP control factor based on watering and/or application of chemical dust suppressant (see Bureau of Mines - United States Department of the Interior "Cost Effectiveness of Dust Controls Used On Unpaved Haul Roads", December 1983).

b. Daily Cover, Final Cover, Liner-Rock Excavation: TSP control factor is estimated from field data collected during the excavation of tailings at a former asbestos mine near Copperopolis, California.

c. Material Processing: TSP control factor is a composite weighted by emissions from each process: 80% control for dump hopper (from vendor literature and inspection of hoppers equipped with hollow cone spray nozzles), 99% control for belt transfers, screens, and crushers (estimated from vendor literature for pulse-jet dust collectors), 95% control for pile stacker (estimated from vendor literature and inspection of stackers with drop height controllers, midbelt deluge sprays, and head pulley solid cone nozzles).

d. Vacuum Sweeping: TSP control factor from AP-42, Section 13.2.1-1 (Paved Roads), 1/95, assuming water flushing of paved road surfaces reduces surface silt loading from 7.4 to 0.082 g/m2.

e. Road Grading: Same as TSP control factor used for road watering.

f. Bench Clearing: TSP control factor based on inspection of mining projects with heavy equipment operation and use of water for dust control.

g. Backhoe: TSP control factor based on inspection of pipeline construction projects with backhoe operation and use of water for dust control.

h. Grader: same as TSP control factor used for road watering.

3.a. Waste, Liner-Rock/Clay, Daily Cover, Final Cover Hauling, Utility Truck, Road Watering: PM10 conversion factor from AP-42, Section 13.2.2, 1/95.

b. Daily Cover, Final Cover, Liner-Rock Excavation: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

c. Material Processing: PM10 conversion factor is an emission-weighted average covering each item of operation - 50% dump hopper (AP-42, Table 11.24-2, 1/95), 100% for belt transfers, screens, crushers (all emissions from dust collectors assumed to be PM10), 50% pile stacker (AP-42, Table 11.24-2, 1/95).

d. Truck Loading: PM10 conversion factor from AP-42, Section 13.2.4-3, 1/95.

e. Truck Dumping: PM10 conversion factor from AP-42, Section 13.2.4-3, 1/95.

f. Daily Cover, Final Cover, Liner-Rock Spreading: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

g. Road Grading: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

h. Bench Clearing: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

I. Backhoe: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

j. Vacuum Sweeper: PM10 conversion factor from AP-42, Section 13.2.1-1, 1/95.

k. Wind Erosion: PM10 conversion factor from "Control of Open Fugitive Dust Sources", EPA-450/3-88-008, 9/88.

l. Grader: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

Table A-5-3

Eagle Mountain Landfill and Recycling Center Rail Emissions For Reduced Volume Alternative With Mitigation						
1. Basic Assumptions	Single Train Capacity (tons of Waste)					3,500
	Desired Daily Capacity (tons of Waste)					14,000
	Average Number of Trains per Day					4
2. Emission Factors in pounds per 1,000 gallons		HC	CO	NOx	PM	SO_2
		14.6	50.0	144.3	8.8	6.7
3. Fuel and Emission Results for a Single Train						
Trip Segment	Fuel Use Per Train (gallons)	Per train emissions in pounds				
		HC	CO	NOx	PM	SO2
Outbound trip(loaded)						
LACTC to Ferrum	1,955	28.5	97.8	282.1	17.2	13.1
Ferrum to Eagle Mountain	1,208	17.6	60.4	174.3	10.6	8.1
Total outbound trip	3,163	46.2	158.2	456.4	27.8	21.2
Return trip (empty)						
Eagle Mountain to Ferrum	249	3.6	12.5	35.9	2.2	1.7
Ferrum to LACTC	1,139	16.6	57.0	164.4	10.6	7.6
Total inbound trip	1,388	20.3	69.4	200.3	12.2	9.3
Round Trip Total, Single Train	**4,551**	**66.4**	**227.6**	**656.7**	**40.0**	**30.5**
4. Results for Average Operating Day						
Trip Segment	Daily Fuel Use (gallons)	Pounds per day from all trains				
		HC	CO	NOx	PM	SO2
LACTC to Ferrum (SP,loaded)	7,820	114	391	1,128	69	52
Ferrum to Eagle Mountain	4,832	71	242	697	43	32
Total outbound trip	12,652	185	633	1,826	111	85
Return Trip (empty)						
Eagle Mountain to Ferrum	996	15	50	144	9	7
Ferrum to LACTC (SP, empty)	4,556	67	228	657	40	31
Total inbound trip	5,552	81	278	801	49	37
Totals For Average Day	**18,204**	**266**	**910**	**2,627**	**160**	**122**
5. Annual Totals						
	Annual Fuel Use (gallons)	HC Tons per Year	CO Tons per Year	NOx Tons per Year	PM_{10} Tons per Year	SO_2 Tons per Year
Outbound Trip (loaded)						
LACTC to Ferrum	2,854,300	21	71	206	13	10
Ferrum to Eagle Mountain	1,763,680	13	40	127	8	6
Total outbound trip	4,617,980	34	115	333	20	15
Inbound Trip (empty)						
Eagle Mountain to Ferrum	363,540	3	9	26	2	1
Ferrum to LACTC (SP, empty)	1,662,940	12	42	120	7	6
Total inbound trip	2,026,480	15	51	146	9	7
Annual Totals	**6,644,460**	**49**	**166**	**479**	**29**	**22**

Table A-5-4

Mitigated On-site Locomotive Emission Rates

Locomotive Emission Rate (grams per second) Per Locomotive

NOx	CO	PM	VOC	SO2
0.2548	0.1217	0.0125	0.0332	0.0095

Reduced Volume Alternative With Mitigation

	Locomotive Hours		
	Max Hour	Max Day	Annual
Phase I yard	2	17.78	6,489
Phase II yard	2	22.22	8,111

	NOx	CO	PM10	VOC	SO2
Locomotives for one-hour average in grams per second					
Phase I yard	0.510	0.243	0.025	0.066	0.019
Phase II yard	0.510	0.243	0.025	0.066	0.019
Total	1.019	0.487	0.050	0.133	0.038
Locomotives for twenty-four-hour average in grams per second					
Phase I yard	0.189	0.090	0.009	0.025	0.007
Phase II yard	0.236	0.113	0.012	0.031	0.009
Total	0.425	0.203	0.021	0.055	0.016
Locomotives for annual average in grams per second					
Phase I yard	0.189	0.090	0.009	0.025	0.007
Phase II yard	0.236	0.113	0.012	0.031	0.009
Total	0.425	0.203	0.021	0.055	0.016
Locomotives for annual average in units of pounds per day					
Phase I yard	36	17	2	5	1
Phase II yard	45	21	2	6	2
Total	81	39	4	11	3
Locomotives for annual average in units of tons per year					
Phase I yard	7	3	0	1	0
Phase II yard	8	4	0	1	0
Total	15	7	1	2	1

Note: These emission rates apply to the following alternatives:
3. Reduced Volume
6. No Land Exchange

Section A-6
Eagle Mountain Landfill And Recycling Center
Emissions Calculations
Rail Access Only Alternative Without Mitigation

Table A-6-1

Eagle Mountain Landfill and Recycling Center
Flare Station Emissions
Rail Only Alternative

Information Source	Emission Factors (lbs/MMBtu) NOx	CO	PM10	VOC	SOx
SCAQMD BACT (1)	0.060	N/A	N/A	N/A	N/A
SCAQMD Test Data (2)				0.022	
SCAQMD Rule 431.1 (3)					0.014
Vendor Data (4)	0.054	0.270	0.024	N/A	N/A
Puente Hills (5)	0.083	0.068	N/A	0.080	0.011
BKK (5)	0.013	0.482	0.028	0.022	0.005
Milliken (6)	0.141	0.132	N/A	0.136	N/A
Best Estimate	0.054	0.27	0.024	0.022	0.014

Maximum Landfill Gas Production Rate =	41400	scfm
	59.616	MMscf/day
Landfill Gas Heat Content (HHV) =	505	BTU/scf
Maximum Heat Input =	1254	MMBTU/hr

	NOx	CO	PM10	VOC	SOx
Emission Factors (lb/MMBTU)	0.054	0.270	0.024	0.022	0.014
Control Efficiency (7):	30%	90%	N/A	50%	N/A
Emissions					
(lb/hr)	47.4	33.9	30.1	13.8	17.6
(lb/day)	1138.0	812.9	722.5	331.2	421.5
(tons/yr)	207.7	148.3	131.9	60.4	76.9
Emissions Per Flare (g/sec)	0.75	0.53	0.47	0.22	0.28

Footnotes:
(1) From South Coast AQMD Best Available Control Technology Guidelines, January 1990.
(2) From a collection of test data compiled by the South Coast AQMD for Prima, Santiago, El Sobrante, Chiquita, and Puente Hills landfills showing NMHC contents of raw landfill gas. VOC emission factor based on raw landfill NMHC content of 13,410 ppmv and vendor guaranteed NMHC flare destruction efficiency of 98%.
(3) Based on raw landfill gas sulfur content of 40 ppmv as limited by South Coast AQMD Rule 431.1 (as amended October 2, 1992).
(4) Manufacturer's guarantee.
(5) California Air Resources Board source test, July 1986.
(6) South Coast AQMD source test, July 1988.
(7) Reflects use of urea injection (or equivalent) for NOx control, oxidation catalyst for CO and VOC control.

Eagle Mountain Landfill and Recycling Center
Onsite Mobile Equipment Exhaust Emissions
Rail Only Alternative Without Mitigation

	Operating Data				Emission Factors (lb/1000 gal)(1)					Daily Emissions (lbs/day)					Annual Emissions (tons/yr)				
	Number	Hrs/Day	Gals/Hr	Days/Yr	NOx	CO	PM10	VOC	SO2	NOx	CO	PM10	VOC	SO2	NOx	CO	PM10	VOC	SO2
PHASE I INTERMODAL/ TRUCK MARSHALING YARD																			
Overhead Crane	5	20	7	365	226.65	39.13	12.99	11.74	7.10	158.65	27.39	9.09	8.22	4.97	28.95	5.00	1.66	1.50	0.91
Rubber-Tired Loader	1	10	2.5	365	226.65	39.13	12.99	11.74	7.10	5.67	0.98	0.32	0.29	0.18	1.03	0.18	0.06	0.05	0.03
PHASE II INTERMODAL YARD																			
Overhead Crane	5	20	7	365	226.65	39.13	12.99	11.74	7.10	158.65	27.39	9.09	8.22	4.97	28.95	5.00	1.66	1.50	0.91
WASTE HAULING FROM PHASE I INTERMODAL YARD																			
Hostling Vehicle	23	10	7	365	226.65	39.13	12.99	11.74	7.10	371.25	64.10	21.28	19.23	11.63	67.75	11.70	3.88	3.51	2.12
WASTE HAULING FROM PHASE II INTERMODAL YARD																			
Hostling Vehicle	24	10	7	365	226.65	39.13	12.99	11.74	7.10	385.53	66.56	22.10	19.97	12.08	70.36	12.15	4.03	3.64	2.20
LANDFILL FACE																			
Crawler Tractor	11	10	13	365	226.65	39.13	12.99	11.74	7.10	318.22	54.94	18.24	16.48	9.97	58.07	10.03	3.33	3.01	1.82
Refuse Compactor	11	10	14	365	226.65	39.13	12.99	11.74	7.10	342.69	59.17	19.64	17.75	10.74	62.54	10.80	3.58	3.24	1.96
DAILY COVER EXCAVATION, HAULING AND SPREADING																			
Rubber-Tired Loader	2	10	12	365	226.65	39.13	12.99	11.74	7.10	48.96	8.45	2.81	2.54	1.53	8.93	1.54	0.51	0.46	0.28
Haul Truck	9	10	9.5	365	226.65	39.13	12.99	11.74	7.10	193.78	33.46	11.11	10.04	6.07	35.37	6.11	2.03	1.83	1.11
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
DUST CONTROL AND ROAD MAINTENANCE																			
Water Tanker	6	10	11	365	226.65	39.13	12.99	11.74	7.10	157.07	27.12	9.00	8.14	4.92	28.66	4.95	1.64	1.48	0.90
Motor Grader	3	10	6	365	226.65	39.13	12.99	11.74	7.10	36.72	6.34	2.10	1.90	1.15	6.70	1.16	0.38	0.35	0.21
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
Vacuum Sweeper	2	10	11	365	226.65	39.13	12.99	11.74	7.10	49.86	8.61	2.86	2.58	1.66	9.10	1.57	0.52	0.47	0.29
FINAL COVER EXCAVATION, HAULING AND SPREADING																			
Rubber-Tired Loader	1	10	7	365	226.65	39.13	12.99	11.74	7.10	15.87	2.74	0.91	0.82	0.50	2.90	0.50	0.17	0.15	0.09
Haul Truck	3	10	6	365	226.65	39.13	12.99	11.74	7.10	36.72	6.34	2.10	1.90	1.15	6.70	1.16	0.38	0.35	0.21
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
Compactor	1	10	10.5	365	226.65	39.13	12.99	11.74	7.10	23.80	4.11	1.36	1.23	0.75	4.34	0.75	0.25	0.22	0.14
LINER CONSTRUCTION CLAY MATERIAL																			
Frontend Loader	1	10	7	365	226.65	39.13	12.99	11.74	7.10	15.87	2.74	0.91	0.82	0.50	2.90	0.50	0.17	0.15	0.09
Haul Truck	1	10	6	365	226.65	39.13	12.99	11.74	7.10	13.60	2.35	0.78	0.70	0.43	2.48	0.43	0.14	0.13	0.08
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
Compactor	1	10	10.5	365	226.65	39.13	12.99	11.74	7.10	23.80	4.11	1.36	1.23	0.75	4.34	0.75	0.25	0.22	0.14
LINER CONSTRUCTION AGGREGATE MATERIAL																			
Frontend Loader	2	10	12	365	226.65	39.13	12.99	11.74	7.10	48.96	8.45	2.81	2.54	1.53	8.93	1.54	0.51	0.46	0.28
Haul Truck	8	10	9.5	365	226.65	39.13	12.99	11.74	7.10	174.41	30.11	10.00	9.03	5.46	31.83	5.50	1.82	1.65	1.00
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
Compactor	1	10	10.5	365	226.65	39.13	12.99	11.74	7.10	23.80	4.11	1.36	1.23	0.75	4.34	0.75	0.25	0.22	0.14
BENCH CLEARING																			
Crawler Tractor	1	10	9	365	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64	3.72	0.64	0.21	0.19	0.12
MISCELLANEOUS																			
Backhoe	2	10	2.5	365	226.65	39.13	12.99	11.74	7.10	10.20	1.76	0.58	0.53	0.32	1.86	0.32	0.11	0.10	0.06
Utility Truck	3	10	5	365	226.65	39.13	12.99	11.74	7.10	30.60	5.28	1.75	1.58	0.96	5.58	0.96	0.32	0.29	0.17
Grader	1	10	6	365	226.65	39.13	12.99	11.74	7.10	13.60	2.35	0.78	0.70	0.43	2.48	0.43	0.14	0.13	0.08
									TOTAL =	2,780.6	480.1	159.4	144.0	87.1	507.5	87.6	29.1	26.3	15.9

Footnote:
(1) NOx, CO, HC, and PM emission factors based on use of off-road engines meeting EPA's 1996 standards with manufacturers able to certify engines below standards by typical margins (i.e., 93% of NOx standard, 12% of CO standard, and 26% of HC standard based on results of 1993 EPA certification tests for on-road heavy-duty Diesel engines, 83% of PM standard based on EPA's PART5 model). SOx emission factors based on use of low sulfur fuel meeting CARB's 1993 standards.

Table A-6-3

Eagle Mountain Landfill and Recycling Center
Fugitive Dust Emissions
Rail Only Alternative Without Mitigation

Activity	Operating Data: Daily Process Rate	Units	Annual Operation (days/yr)	TSP Emissions: Emission Factor(1) (lbs/unit)	Control Factor(2) (%)	Emission Rate (lbs/day)	PM10 Emissions: PM10 Conversion Factor(3)	Emission Rate (lbs/day)	Emission Rate (tons/yr)
Waste Hauling (From Phase I Yard)	684	vmt	365	3.87	95%	132.3	0.45	59.5	10.9
Waste Hauling (From Phase II Yard)	2254	vmt	365	3.87	95%	435.9	0.45	196.1	35.8
Daily Cover Excavation	18	hr	365	5.70	90%	10.3	0.13	1.4	0.2
Daily Cover Truck Loading	8456.4	ton	365	0.01	0%	102.1	0.47	48.3	8.8
Daily Cover Hauling	176	vmt	365	5.63	95%	49.5	0.45	22.3	4.1
Daily Cover Dumping	8456.4	ton	365	0.01	0%	102.1	0.47	48.3	8.8
Daily Cover Spreading	10	hr	365	5.70	0%	57.0	0.13	7.5	1.4
Final Cover Excavation	10	hr	365	5.70	90%	5.7	0.13	0.8	0.1
Final Cover Truck Loading	1304	ton	365	0.01	0%	15.8	0.47	7.5	1.4
Final Cover Hauling	99	vmt	365	3.87	95%	19.2	0.45	8.6	1.6
Final Cover Dumping	1304	ton	365	0.01	0%	15.8	0.47	7.5	1.4
Final Cover Spreading	10	hr	365	5.70	0%	57.0	0.13	7.5	1.4
Liner Material Hauling (Clay)	55	vmt	365	3.87	95%	10.7	0.45	4.8	0.9
Liner Material Excavation (Rock)	18	hr	365	5.70	90%	10.3	0.13	1.4	0.2
Liner Material Truck Loading (Rock)	7260	ton	365	0.00	0%	4.4	0.47	2.1	0.4
Liner Material Hauling (Rock)	186	vmt	365	5.63	95%	52.3	0.45	23.5	4.3
Liner Material Dumping (Rock)	7260	ton	365	0.00	0%	4.4	0.47	2.1	0.4
Liner Material Spreading (Rock)	10	hr	365	7.04	0%	70.4	0.13	9.3	1.7
Road Watering	441	vmt	365	1.31	95%	29.0	0.45	13.0	2.4
Paved Road Vacuuming	100	vmt	365	1.17	95%	5.8	0.20	1.1	0.2
Road Grading	54	vmt	365	0.23	60%	4.9	0.54	2.6	0.5
Road Blading	10	hr	365	4.36	0%	43.6	0.13	5.7	1.0
Bench Clearing	10	hr	365	5.70	30%	39.9	0.16	6.5	1.2
Backhoe	18	hr	365	0.04	30%	0.5	0.77	0.4	0.1
Utility Truck Travel	135	vmt	365	0.26	95%	1.7	0.45	0.8	0.1
Grader	20	vmt	365	0.23	60%	1.8	0.54	1.0	0.2
Windblown Dust (Unpaved Haul Roads)	890,419	sq.ft.	365	0.00001	0%	10.3	0.50	5.1	0.9
Windblown Dust (Daily Cover)	87,000	sq.ft.	365	0.00001	0%	1.0	0.50	0.5	0.1
Windblown Dust (Final Cover)	21,750	sq.ft.	365	0.00001	0%	0.3	0.50	0.1	0.0
Windblown Dust (Daily Cover Borrow Area)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Final Cover Borrow Area)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Liner Borrow Area- Rock)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Phase 1 Yard)	870,000	sq.ft.	365	0.00001	0%	10.0	0.50	5.0	0.9
Windblown Dust (Phase 2 Yard)	217,500	sq.ft.	365	0.00001	0%	2.5	0.50	1.3	0.2
Windblown Dust (Liner-Rock)	21,750	sq.ft.	365	0.00001	0%	0.3	0.50	0.1	0.0
Material Crushing Plant	277	ton	365	0.05	99%	0.2	0.88	0.2	0.0
Material Screening Plant	16,743	ton	365	0.04	99%	8.3	0.84	7.0	1.3
					TOTAL =	1315.3		508.9	92.9

Note: See notes on following page.

Footnotes (Fugitive Dust Emissions):

1.a. Waste Hauling: TSP emission factor is computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using a surface silt of 1.7%, vehicle speed of 30 mph, 6 wheels, 20 days precipitation, and an average vehicle weight of 30 tons. The silt content is from a 9/26/79 sieve analysis of the coarse tailing pile.

b. Daily Cover, Final Cover, Liner-Rock Excavation: TSP emission factor is from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95, for 1% silt, 1% moisture content. The silt and moisture contents are an estimate for low silt /dry material.

c. Road bulldozing: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95, for 1.7% silt, 2% moisture content. The silt content is from a 9/26/79 sieve analysis of the coarse tailing pile and the moisture content is an estimate for dry material.

d. Material Crushing Plant: TSP emission factor is calculated as the sum of emission factors for the process - 0.0003 lbs/ton dump hopper, 0.00294 lbs/ton for belt transfer, 0.005 lbs/ton for primary, secondary, and tertiary crushers, 0.0315 lbs/ton for screens, 0.00294 lbs/ton for stacker (AP-42, Table 11.19.2-2, 1/95).

e. Material Screening Plant: TSP emission factor is calculated as the sum of emission factors for the process - 0.0003 lbs/ton dump hopper, 0.00294 lbs/ton for belt transfer, 0.0315 lbs/ton for screens, 0.00294 lbs/ton for stacker (AP-42, Table 11.19.2-2, 1/95).

f. Daily Cover, Final Cover Truck Loading/Dumping: TSP emission factor from AP-42, Section 13.2.4-3, 1/95, using 8.3 mph wind and 1% moisture content. The average wind speed is from data collected by an onsite monitoring station while the moisture content is an estimate for dry material.

g. Liner-Rock Truck Loading/Dumping: TSP emission factor from AP-42, Section 13.2.4-3, 1/95, using 8.3 mph wind and 8.5% moisture content. The average wind speed is from data collected onsite and the moisture content is from Section 7.6 of the Report of Waste Discharge (ROWD), 1992, GeoSyntec.

h. Daily Cover and Final Cover Hauling: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 30 mph, 4 wheels, 20 days precipitation, and an average vehicle weight of 68.5 tons.

i. Daily Cover, Final Cover Spreading: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 1% silt, 1% moisture content. Silt and moisture contents are an estimate for low silt dry material.

j. Liner-Rock Spreading: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 12.2% silt, 8.5% moisture content. Silt and moisture contents from Section 7.6 of the Report of Waste Discharge (ROWD), 1992, GeoSyntec.

k. Road Watering: TSP emission factor computed from AP-42, Section 13.2.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 7 mph, 4 wheels, 20 days of precipitation, and an average vehicle weight of 68.5 tons.

l. Road Grading: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 2 mph.

m. Final Cover, Liner-Clay Hauling: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 30 mph, 6 wheels, 20 days of precipitation, and an average vehicle weight of 30 tons.

n. Bench Clearing: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 1% silt, 1% moisture content. The silt and moisture contents are an estimate for dry material.

o. Backhoe: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 1 mph.

p. Utility Truck: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 5 mph, 6 wheels, 20 days of precipitation, and an average vehicle weight of 8 tons.

q. Grader: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 2 mph.

r. Vacuum Sweeper: TSP emission factor computed from AP-42, Section 13.2.1 (Paved Roads), 1/95, using surface silt loading of 7.4 g/m^2 , and an average vehicle weight of 10 tons.

s. Wind Erosion: TSP emission factor computed from "Control of Open Fugitive Dust Sources", EPA-450/3-88-008, 9/88, using material size mode of 7.0 mm from 9/26/79 sieve analyses of coarse tailing pile, threshold friction velocity of 1.5 m/sec from Figure 6-1 of EPA document, roughness height of 0.1 m from Figure 6-4 of EPA document, and onsite wind data.

2.a. Waste, Daily Cover, Final Cover, Liner-Rock/Clay Hauling, Road Watering, Utility Truck: TSP control factor based on watering and/or application of chemical dust suppressant (see Bureau of Mines - United States Department of the Interior "Cost Effectiveness of Dust Controls Used On Unpaved Haul Roads", December 1983).

b. Daily Cover, Final Cover, Liner-Rock Excavation: TSP control factor is estimated from field data collected during the excavation of tailings at a former asbestos mine near Copperopolis, California.

c. Material Processing: TSP control factor is a composite weighted by emissions from each process: 80% control for dump hopper (from vendor literature and inspection of hoppers equipped with hollow cone spray nozzles), 99% control for belt transfers, screens, and crushers (estimated from vendor literature for pulse-jet dust collectors), 95% control for pile stacker (estimated from vendor literature and inspection of stackers with drop height controllers, midbelt deluge sprays, and head pulley solid cone nozzles).

d. Vacuum Sweeping: TSP control factor from AP-42, Section 13.2.1-1 (Paved Roads), 1/95, assuming water flushing of paved road surfaces reduces surface silt loading from 7.4 to 0.082 g/m2.

e. Road Grading: Same as TSP control factor used for road watering.

f. Bench Clearing: TSP control factor based on inspection of mining projects with heavy equipment operation and use of water for dust control.

g. Backhoe: TSP control factor based on inspection of pipeline construction projects with backhoe operation and use of water for dust control.

h. Grader: same as TSP control factor used for road watering.

3.a. Waste, Liner-Rock/Clay, Daily Cover, Final Cover Hauling, Utility Truck, Road Watering: PM10 conversion factor from AP-42, Section 13.2.2, 1/95.

b. Daily Cover, Final Cover, Liner-Rock Excavation: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

c. Material Processing: PM10 conversion factor is an emission-weighted average covering each item of operation - 50% dump hopper (AP-42, Table 11.24-2, 1/95), 100% for belt transfers, screens, crushers (all emissions from dust collectors assumed to be PM10), 50% pile stacker (AP-42, Table 11.24-2, 1/95).

d. Truck Loading: PM10 conversion factor from AP-42, Section 13.2.4-3, 1/95.

e. Truck Dumping: PM10 conversion factor from AP-42, Section 13.2.4-3, 1/95.

f. Daily Cover, Final Cover, Liner-Rock Spreading: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

g. Road Grading: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

h. Bench Clearing: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

I. Backhoe: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

j. Vacuum Sweeper: PM10 conversion factor from AP-42, Section 13.2.1-1, 1/95.

k. Wind Erosion: PM10 conversion factor from "Control of Open Fugitive Dust Sources", EPA-450/3-88-008, 9/88.

l. Grader: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

Section A-7
Emissions Calculations
Rail Access Only Alternative With Mitigation

Table A-7-1

Eagle Mountain Landfill and Recycling Center
Onsite Mobile Equipment Exhaust Emissions
Rail Only Alternative With Mitigation

	Operating Data				Emission Factors (lb/1000 gal)(1)					Daily Emissions (lbs/day)					Annual Emissions (tons/yr)				
	Number	Hrs/Day	Gals/Hr	Days/Yr	NOx	CO	PM10	VOC	SO2	NOx	CO	PM10	VOC	SO2	NOx	CO	PM10	VOC	SO2
PHASE I INTERMODAL/ TRUCK MARSHALING YARD																			
Overhead Crane	5	20	7	365	125.22	39.13	12.99	11.74	7.10	87.65	27.39	9.09	8.22	4.97	16.00	5.00	1.66	1.50	0.91
Rubber-Tired Loader	1	10	2.5	365	125.22	39.13	12.99	11.74	7.10	3.13	0.98	0.32	0.29	0.18	0.57	0.18	0.06	0.05	0.03
PHASE II INTERMODAL YARD																			
Overhead Crane	5	20	7	385	125.22	39.13	12.99	11.74	7.10	87.65	27.39	9.09	8.22	4.97	16.00	5.00	1.66	1.50	0.91
WASTE HAULING FROM PHASE I INTERMODAL YARD																			
Hostling Vehicle	23	10	7	365	62.61	74.35	3.25	11.74	7.10	102.56	121.76	5.32	19.23	11.63	16.72	22.23	0.97	3.51	2.12
WASTE HAULING FROM PHASE II INTERMODAL YARD																			
Hostling Vehicle	24	10	7	365	62.61	74.35	3.25	11.74	7.10	106.50	126.47	5.52	19.97	12.08	19.44	23.08	1.01	3.64	2.20
LANDFILL FACE																			
Crawler Tractor	11	10	13	365	125.22	39.13	12.99	11.74	7.10	175.61	54.94	18.24	16.48	9.97	32.09	10.03	3.33	3.01	1.82
Refuse Compactor	11	10	14	365	125.22	39.13	12.99	11.74	7.10	169.33	59.17	19.64	17.75	10.74	34.55	10.80	3.58	3.24	1.96
DAILY COVER EXCAVATION, HAULING AND SPREADING																			
Rubber-Tired Loader	2	10	12	365	125.22	39.13	12.99	11.74	7.10	27.05	8.45	2.81	2.54	1.53	4.94	1.54	0.51	0.46	0.28
Haul Truck	3	10	9.5	365	62.61	74.35	3.25	11.74	7.10	16.06	19.07	0.83	3.01	1.82	2.93	3.46	0.15	0.55	0.33
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
DUST CONTROL AND ROAD MAINTENANCE																			
Water Tanker	6	10	11	365	62.61	74.35	3.25	11.74	7.10	43.39	51.52	2.25	8.14	4.92	7.92	9.40	0.41	1.48	0.90
Motor Grader	3	10	6	365	125.22	39.13	12.99	11.74	7.10	20.29	6.34	2.10	1.90	1.15	3.70	1.16	0.38	0.35	0.21
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
Vacuum Sweeper	2	10	11	365	62.61	74.35	3.25	11.74	7.10	13.77	16.36	0.71	2.58	1.56	2.51	2.99	0.13	0.47	0.29
FINAL COVER EXCAVATION, HAULING AND SPREADING																			
Rubber-Tired Loader	1	10	7	365	125.22	39.13	12.99	11.74	7.10	8.77	2.74	0.91	0.82	0.50	1.60	0.50	0.17	0.15	0.09
Haul Truck	1	10	6	365	62.61	74.35	3.25	11.74	7.10	3.76	4.46	0.19	0.70	0.43	0.69	0.81	0.04	0.13	0.08
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
Compactor	1	10	10.5	365	125.22	39.13	12.99	11.74	7.10	13.15	4.11	1.36	1.23	0.75	2.40	0.75	0.25	0.22	0.14
LINER CONSTRUCTION CLAY MATERIAL																			
Frontend Loader	1	10	7	365	125.22	39.13	12.99	11.74	7.10	8.77	2.74	0.91	0.82	0.50	1.60	0.50	0.17	0.15	0.09
Haul Truck	1	10	6	365	62.61	74.35	3.25	11.74	7.10	3.76	4.46	0.19	0.70	0.43	0.69	0.81	0.04	0.13	0.08
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
Compactor	1	10	10.5	365	125.22	39.13	12.99	11.74	7.10	13.15	4.11	1.36	1.23	0.75	2.40	0.75	0.25	0.22	0.14
LINER CONSTRUCTION AGGREGATE MATERIAL																			
Frontend Loader	2	10	12	365	125.22	39.13	12.99	11.74	7.10	27.05	8.45	2.81	2.54	1.53	4.94	1.54	0.51	0.46	0.28
Haul Truck	3	10	9.5	365	62.61	74.35	3.25	11.74	7.10	16.06	19.07	0.83	3.01	1.82	2.93	3.46	0.15	0.55	0.33
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
Compactor	1	10	10.5	365	125.22	39.13	12.99	11.74	7.10	13.15	4.11	1.36	1.23	0.75	2.40	0.75	0.25	0.22	0.14
BENCH CLEARING																			
Crawler Tractor	1	10	9	365	125.22	39.13	12.99	11.74	7.10	11.27	3.52	1.17	1.06	0.64	2.06	0.64	0.21	0.19	0.12
MISCELLANEOUS																			
Backhoe	2	10	2.5	365	125.22	39.13	12.99	11.74	7.10	5.63	1.76	0.58	0.53	0.32	1.03	0.32	0.11	0.10	0.06
Utility Truck	3	10	5	365	62.61	74.35	3.25	11.74	7.10	6.45	10.04	0.44	1.58	0.96	1.54	1.83	0.08	0.29	0.17
Grader	1	10	6	365	125.22	39.13	12.99	11.74	7.10	7.51	2.35	0.76	0.70	0.43	1.37	0.43	0.14	0.13	0.08
									TOTAL =	1,070.0	609.4	94.7	129.8	76.5	195.3	111.2	17.3	23.7	14.3

Footnote:
(1) For haul trucks, water trucks, and hostling vehicles, CO, PM10, and HC emission factors based on use of on-road engines meeting EPA's 1998 standards with manufacturers able to certify engines below standards by typical margins (i.e., 12% of CO standard and 26% of HC standard based on results of 1993 EPA certification tests for on-road heavy-duty Diesel engines, 83% of PM standard based on EPA PART5 model). NOx emission factor based on use of on-road engines meeting standards discussed in EPA's notice of proposed rulemaking for heavy-duty on-road engines (60 FR 45580) with manufacturers able to certify engines below standards by typical margins (i.e., 60% of NOx standard based on EPA Mobile5a model). SOx emission factors based on use of low sulfur fuel meeting CARB's 1993 standards.

For bulldozers, loaders, scrappers, and crawler tractors, CO, HC, and PM emission factors based on use of off-road engines meeting EPA's 1996 standards with manufacturers able to certify engines below standards by typical margins (i.e., 12% of CO standard and 26% of HC standard based on results of 1993 EPA certification tests for on-road heavy-duty Diesel engines, 83% of PM standard based on EPA PART5 model). NOx emission factor based on use of off-road engines meeting levels expected in future EPA rulemaking for off-road Diesel engines with manufacturers able to certify engines below standards by typical margins (i.e., 60% of NOx standard based on EPA Mobile5a model). SOx emission factors based on use of low sulfur fuel meeting CARB's [illegible] standards.

Eagle Mountain Landfill and Recycling Center
Fugitive Dust Emissions
Rail Only Alternative With Mitigation

Activity	Operating Data: Daily Process Rate	Units	Annual Operation (days/yr)	TSP Emissions: Emission Factor(1) (lbs/unit)	Control Factor(2) (%)	Emission Rate (lbs/day)	PM10 Emissions: PM10 Conversion Factor(3)	Emission Rate (lbs/day)	Emission Rate (tons/yr)
Waste Hauling (From Phase I Yard)	684	vmt	365	3.87	95%	132.3	0.45	59.5	10.9
Waste Hauling (From Phase II Yard)	2254	vmt	365	3.87	95%	435.9	0.45	196.1	35.8
Daily Cover Excavation	18	hr	365	5.70	90%	10.3	0.13	1.4	0.2
Daily Cover Truck Loading	8456.4	ton	365	0.01	0%	102.1	0.47	48.3	8.8
Daily Cover Hauling	176	vmt	365	5.63	95%	49.5	0.45	22.3	4.1
Daily Cover Dumping	8456.4	ton	365	0.01	0%	102.1	0.47	48.3	8.8
Daily Cover Spreading	10	hr	365	5.70	0%	57.0	0.13	7.5	1.4
Final Cover Excavation	10	hr	365	5.70	90%	5.7	0.13	0.8	0.1
Final Cover Truck Loading	1304	ton	365	0.01	0%	15.8	0.47	7.5	1.4
Final Cover Hauling	99	vmt	365	3.87	95%	19.2	0.45	8.6	1.6
Final Cover Dumping	1304	ton	365	0.01	0%	15.8	0.47	7.5	1.4
Final Cover Spreading	10	hr	365	5.70	0%	57.0	0.13	7.5	1.4
Liner Material Hauling (Clay)	55	vmt	365	3.87	95%	10.7	0.45	4.8	0.9
Liner Material Excavation (Rock)	18	hr	365	5.70	90%	10.3	0.13	1.4	0.2
Liner Material Truck Loading (Rock)	7260	ton	365	0.00	0%	4.4	0.47	2.1	0.4
Liner Material Hauling (Rock)	186	vmt	365	5.63	95%	52.3	0.45	23.5	4.3
Liner Material Dumping (Rock)	7260	ton	365	0.00	0%	4.4	0.47	2.1	0.4
Liner Material Spreading (Rock)	10	hr	365	7.04	0%	70.4	0.13	9.3	1.7
Road Watering	441	vmt	365	1.31	95%	29.0	0.45	13.0	2.4
Paved Road Vacuuming	100	vmt	365	1.17	95%	5.8	0.20	1.1	0.2
Road Grading	54	vmt	365	0.23	60%	4.9	0.54	2.6	0.5
Road Blading	10	hr	365	4.36	0%	43.6	0.13	5.7	1.0
Bench Clearing	10	hr	365	5.70	30%	39.9	0.16	6.5	1.2
Backhoe	18	hr	365	0.04	30%	0.5	0.77	0.4	0.1
Utility Truck Travel	135	vmt	365	0.26	95%	1.7	0.45	0.8	0.1
Grader	20	vmt	365	0.23	60%	1.8	0.54	1.0	0.2
Windblown Dust (Unpaved Haul Roads)	890,419	sq.ft.	365	0.00001	0%	10.3	0.50	5.1	0.9
Windblown Dust (Daily Cover)	87,000	sq.ft.	365	0.00001	0%	1.0	0.50	0.5	0.1
Windblown Dust (Final Cover)	21,750	sq.ft.	365	0.00001	0%	0.3	0.50	0.1	0.0
Windblown Dust (Daily Cover Borrow Area)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Final Cover Borrow Area)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Liner Borrow Area- Rock)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Phase 1 Yard)	870,000	sq.ft.	365	0.00001	0%	10.0	0.50	5.0	0.9
Windblown Dust (Phase 2 Yard)	217,500	sq.ft.	365	0.00001	0%	2.5	0.50	1.3	0.2
Windblown Dust (Liner-Rock)	21,750	sq.ft.	365	0.00001	0%	0.3	0.50	0.1	0.0
Material Crushing Plant	277	ton	365	0.05	99%	0.2	0.88	0.2	0.0
Material Screening Plant	16,743	ton	365	0.04	99%	8.3	0.84	7.0	1.3
					TOTAL =	1315.3		508.9	92.9

Note: See notes on following page.

Footnotes (Fugitive Dust Emissions):

1.a. Waste Hauling: TSP emission factor is computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using a surface silt of 1.7%, vehicle speed of 30 mph, 6 wheels, 20 days precipitation, and an average vehicle weight of 30 tons. The silt content is from a 9/26/79 sieve analysis of the coarse tailing pile.

b. Daily Cover, Final Cover, Liner-Rock Excavation: TSP emission factor is from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95, for 1% silt, 1% moisture content. The silt and moisture contents are an estimate for low silt /dry material.

c. Road bulldozing: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95, for 1.7% silt, 2% moisture content. The silt content is from a 9/26/79 sieve analysis of the coarse tailing pile and the moisture content is an estimate for dry material.

d. Material Crushing Plant: TSP emission factor is calculated as the sum of emission factors for the process - 0.0003 lbs/ton dump hopper, 0.00294 lbs/ton for belt transfer, 0.005 lbs/ton for primary, secondary, and tertiary crushers, 0.0315 lbs/ton for screens, 0.00294 lbs/ton for stacker (AP-42, Table 11.19.2-2, 1/95).

e. Material Screening Plant: TSP emission factor is calculated as the sum of emission factors for the process - 0.0003 lbs/ton dump hopper, 0.00294 lbs/ton for belt transfer, 0.0315 lbs/ton for screens, 0.00294 lbs/ton for stacker (AP-42, Table 11.19.2-2, 1/95).

f. Daily Cover, Final Cover Truck Loading/Dumping: TSP emission factor from AP-42, Section 13.2.4-3, 1/95, using 8.3 mph wind and 1% moisture content. The average wind speed is from data collected by an onsite monitoring station while the moisture content is an estimate for dry material.

g. Liner-Rock Truck Loading/Dumping: TSP emission factor from AP-42, Section 13.2.4-3, 1/95, using 8.3 mph wind and 8.5% moisture content. The average wind speed is from data collected onsite and the moisture content is from Section 7.6 of the Report of Waste Discharge (ROWD), 1992, GeoSyntec.

h. Daily Cover and Final Cover Hauling: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 30 mph, 4 wheels, 20 days precipitation, and an average vehicle weight of 68.5 tons.

I. Daily Cover, Final Cover Spreading: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 1% silt, 1% moisture content. Silt and moisture contents are an estimate for low silt dry material.

j. Liner-Rock Spreading: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 12.2% silt, 8.5% moisture content. Silt and moisture contents from Section 7.6 of the Report of Waste Discharge (ROWD), 1992, GeoSyntec.

k. Road Watering: TSP emission factor computed from AP-42, Section 13.2.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 7 mph, 4 wheels, 20 days of precipitation, and an average vehicle weight of 68.5 tons.

l. Road Grading: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 2 mph.

m. Final Cover, Liner-Clay Hauling: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 30 mph, 6 wheels, 20 days of precipitation, and an average vehicle weight of 30 tons.

n. Bench Clearing: TSP emission factor from AP-42, Table 11.9-2 (Western Coal Mines - bulldozing overburden), 1/95 for 1% silt, 1% moisture content. The silt and moisture contents are an estimate for dry material.

o. Backhoe: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 1 mph.

p. Utility Truck: TSP emission factor computed from AP-42, Section 13.2.2 (Unpaved Roads), 1/95, using surface silt of 1.7%, vehicle speed of 5 mph, 6 wheels, 20 days of precipitation, and an average vehicle weight of 8 tons.

q. Grader: TSP emission factor computed from AP-42, Table 11.9-2 (Western Coal Mines - grading), 1/95, for unit operating speed of 2 mph.

r. Vacuum Sweeper: TSP emission factor computed from AP-42, Section 13.2.1 (Paved Roads), 1/95, using surface silt loading of 7.4 g/m^2 , and an average vehicle weight of 10 tons.

s. Wind Erosion: TSP emission factor computed from "Control of Open Fugitive Dust Sources", EPA-450/3-88-008, 9/88, using material size mode of 7.0 mm from 9/26/79 sieve analyses of coarse tailing pile, threshold friction velocity of 1.5 m/sec from Figure 6-1 of EPA document, roughness height of 0.1 m from Figure 6-4 of EPA document, and onsite wind data.

2.a. Waste, Daily Cover, Final Cover, Liner-Rock/Clay Hauling, Road Watering, Utility Truck: TSP control factor based on watering and/or application of chemical dust suppressant (see Bureau of Mines - United States Department of the Interior "Cost Effectiveness of Dust Controls Used On Unpaved Haul Roads", December 1983).

b. Daily Cover, Final Cover, Liner-Rock Excavation: TSP control factor is estimated from field data collected during the excavation of tailings at a former asbestos mine near Copperopolis, California.

c. Material Processing: TSP control factor is a composite weighted by emissions from each process: 80% control for dump hopper (from vendor literature and inspection of hoppers equipped with hollow cone spray nozzles), 99% control for belt transfers, screens, and crushers (estimated from vendor literature for pulse-jet dust collectors), 95% control for pile stacker (estimated from vendor literature and inspection of stackers with drop height controllers, midbelt deluge sprays, and head pulley solid cone nozzles).

d. Vacuum Sweeping: TSP control factor from AP-42, Section 13.2.1-1 (Paved Roads), 1/95, assuming water flushing of paved road surfaces reduces surface silt loading from 7.4 to 0.082 g/m2.

e. Road Grading: Same as TSP control factor used for road watering.

f. Bench Clearing: TSP control factor based on inspection of mining projects with heavy equipment operation and use of water for dust control.

g. Backhoe: TSP control factor based on inspection of pipeline construction projects with backhoe operation and use of water for dust control.

h. Grader: same as TSP control factor used for road watering.

3.a. Waste, Liner-Rock/Clay, Daily Cover, Final Cover Hauling, Utility Truck, Road Watering: PM10 conversion factor from AP-42, Section 13.2.2, 1/95.

b. Daily Cover, Final Cover, Liner-Rock Excavation: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

c. Material Processing: PM10 conversion factor is an emission-weighted average covering each item of operation - 50% dump hopper (AP-42, Table 11.24-2, 1/95), 100% for belt transfers, screens, crushers (all emissions from dust collectors assumed to be PM10), 50% pile stacker (AP-42, Table 11.24-2, 1/95).

d. Truck Loading: PM10 conversion factor from AP-42, Section 13.2.4-3, 1/95.

e. Truck Dumping: PM10 conversion factor from AP-42, Section 13.2.4-3, 1/95.

f. Daily Cover, Final Cover, Liner-Rock Spreading: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

g. Road Grading: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

h. Bench Clearing: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

I. Backhoe: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

j. Vacuum Sweeper: PM10 conversion factor from AP-42, Section 13.2.1-1, 1/95.

k. Wind Erosion: PM10 conversion factor from "Control of Open Fugitive Dust Sources", EPA-450/3-88-008, 9/88.

l. Grader: PM10 conversion factor from AP-42, Table 11.9-2, 1/95.

Section A-8
Eagle Mountain Landfill And Recycling Center
Emissions Calculations
Alternate Road Alignment Alternative Without Mitigation

Table A-8-1

Eagle Mountain Landfill and Recycling Center On-Highway Truck Emissions Alternate Road Alignment Alternative Without Mitigation Haul 2,000 tons/day of Waste (100 trucks/day) Average Distance with 240 mile round trip Emission Factors from EMFAC7F for Class 8B Trucks			
Species	Emission Factor (g/mi)	Emissions	
		lb/day	tons/yr
Total Organic Gases (TOG)	1.98	105	19
Reactive Organic Gases (ROG)	1.90	101	18
CO	9.10	481	88
NOx	18.95	1,003	183
PM_{10} (Exhaust)	1.91	101	18
PM_{10} (Tire Wear)	0.66	35	6
Total PM_{10}	2.57	136	25
SO_2	0.52	28	5

Section A-9
Eagle Mountain Landfill and Recycling Center
Emissions Calculations
No Townsite Alternative

Table A-9-1

Eagle Mountain Landfill and Recycling Center
No Townsite Alternative-Emissions Associated with Worker Travel to and from Project Site

Trip Activity	No. Vehicles	Length of Trip miles/day	Em. Factor (grams/mi) 1 CO	ROG	NOx	PM10	Emissions (lb/day) CO	ROG	NOx	PM10
Desert Center	25	22	3.25	0.23	0.63	0.11	3.94	0.28	0.76	0.13
Blyth/Indio	225	122	3.25	0.23	0.63	0.11	196.71	13.92	38.13	6.66
	No. Vehicles	No. Starts	Em. Factor (grams/trip)							
Cold Start	250	2	82.1	4.34	2.5		90.52	4.78	2.76	0.00
Total							291.17	18.99	41.65	6.79

1- Factors for CO, ROG, and NOx include exhaust and evaporative emissions. Factor for PM10 includes exhaust and tire wear.

Assumptions for Calculating No Townsite Alternative

Total Number of Vehicles	250
Vehicle Calendar Year	1995
Ridership per vehicle	1.0
Average Gross Vehicle Weight	6000 pounds and less
Average Vehicle Speed	50 mph
Number of Cold Starts per Vehicle	2
Number of Vehicle Round Trips from Desert Center	25
Number of Vehicle Round Trips from Blyth/Indio	225
Ratio of Workers in Blyth and Indio to Desert Center	0.9
Emission Factor Area	Area 3 (Riverside County)

Note: Emission Factors from South Coast AQMD CEQA Air Quality Handbook Table A9-5-J-3, April, 1993

Section A-10
Eagle Mountain Landfill And Recycling Center
Emissions Calculations
No Project Alternative

Table A-10-1

Eagle Mountain Landfill and Recycling Center
Fugitive Dust Emissions
No Project Alternative(1)

Activity	Operating Data: Daily Process Rate	Units	Annual Operation (days/yr)	TSP Emissions: Emission Factor (lbs/unit)	Control Factor (%)	Emission Rate (lbs/day)	PM10 Emissions: PM10 Conversion Factor	Emission Rate (lbs/day)	Emission Rate (tons/yr)
Waste Hauling	3264	vmt	365	3.87	95%	631.3	0.45	284.1	51.8
Daily Cover Excavation	20	hr	365	5.70	90%	11.4	0.13	1.5	0.3
Daily Cover Truck Loading	9396	ton	365	0.01	0%	113.5	0.47	53.7	9.8
Daily Cover Hauling	195	vmt	365	5.63	95%	55.0	0.45	24.8	4.5
Daily Cover Dumping	9396	ton	365	0.01	0%	113.5	0.47	53.7	9.8
Daily Cover Spreading	10	hr	365	5.70	0%	57.0	0.13	7.5	1.4
Final Cover Excavation	10	hr	365	5.70	90%	5.7	0.13	0.8	0.1
Final Cover Truck Loading	1449	ton	365	0.01	0%	17.5	0.47	8.3	1.5
Final Cover Hauling	110	vmt	365	3.87	95%	21.3	0.45	9.6	1.7
Final Cover Dumping	1449	ton	365	0.01	0%	17.5	0.47	8.3	1.5
Final Cover Spreading	10	hr	365	5.70	0%	57.0	0.13	7.5	1.4
Liner Material Hauling (Clay)	61	vmt	365	3.87	95%	11.8	0.45	5.3	1.0
Liner Material Excavation (Rock)	20	hr	365	5.70	90%	11.4	0.13	1.5	0.3
Liner Material Truck Loading (Rock)	8066	ton	365	0.00	0%	4.8	0.47	2.3	0.4
Liner Material Hauling (Rock)	206	vmt	365	5.63	95%	58.1	0.45	26.2	4.8
Liner Material Dumping (Rock)	8066	ton	365	0.00	0%	4.8	0.47	2.3	0.4
Liner Material Spreading (Rock)	10	hr	365	7.04	0%	70.4	0.13	9.3	1.7
Road Watering	490	vmt	365	1.31	95%	32.2	0.45	14.5	2.6
Paved Road Vacuuming	100	vmt	365	1.17	95%	5.8	0.20	1.1	0.2
Road Grading	60	vmt	365	0.23	60%	5.4	0.54	2.9	0.5
Road Blading	10	hr	365	4.36	0%	43.6	0.13	5.7	1.0
Backhoe	20	hr	365	0.04	30%	0.6	0.77	0.4	0.1
Utility Truck Travel	150	vmt	365	0.26	95%	1.9	0.45	0.9	0.2
Grader	20	vmt	365	0.23	60%	1.8	0.54	1.0	0.2
Windblown Dust (Unpaved Haul Roads)	890,419	sq.ft.	365	0.00001	0%	10.3	0.50	5.1	0.9
Windblown Dust (Daily Cover)	87,000	sq.ft.	365	0.00001	0%	1.0	0.50	0.5	0.1
Windblown Dust (Final Cover)	21,750	sq.ft.	365	0.00001	0%	0.3	0.50	0.1	0.0
Windblown Dust (Daily Cover Borrow Area)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Final Cover Borrow Area)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Liner Borrow Area- Rock)	10,875	sq.ft.	365	0.00001	0%	0.1	0.50	0.1	0.0
Windblown Dust (Phase 1 Yard)	870,000	sq.ft.	365	0.00001	0%	10.0	0.50	5.0	0.9
Windblown Dust (Phase 2 Yard)	217,500	sq.ft.	365	0.00001	0%	2.5	0.50	1.3	0.2
Windblown Dust (Liner-Rock)	21,750	sq.ft.	365	0.00001	0%	0.3	0.50	0.1	0.0
					TOTAL =	1378.1		545.3	99.5

Footnote:
(1) Emissions based on the activity rates, emission factors, and control techniques assumed for the Proposed Project without mitigation.

Table 10-2

Eagle Mountain Landfill and Recycling Center
Onsite Mobile Equipment Exhaust Emissions
No Project Alternative

	Operating Data(1)				Emission Factors (lb/1000 gal)(2)					Daily Emissions (lbs/day)					Annual Emissions (tons/yr)				
	Number	Hrs/Day	Gals/Hr	Days/Yr	NOx	CO	PM10	VOC	SO2	NOx	CO	PM10	VOC	SO2	NOx	CO	PM10	VOC	SO2
WASTE HAULING																			
Hostling Vehicle	53	10	7	365	339.97	109.57	23.32	31.31	7.10	1261.30	406.50	86.53	116.14	26.34	230.19	74.19	15.79	21.20	4.81
LANDFILL FACE																			
Crawler Tractor	12	10	13	365	364.76	187.83	32.07	50.87	7.10	569.03	293.02	50.03	79.36	11.08	103.85	53.48	9.13	14.48	2.02
Refuse Compactor	12	10	14	365	329.35	121.31	23.32	31.31	7.10	553.31	203.80	39.18	52.59	11.93	100.98	37.19	7.15	9.60	2.18
DAILY COVER EXCAVATION, HAULING AND SPREADING																			
Rubber-Tired Loader	2	10	12	365	364.76	187.83	37.90	31.31	7.10	87.54	45.08	9.10	7.51	1.70	15.98	8.23	1.66	1.37	0.31
Haul Truck	10	10	9.5	365	339.97	109.57	23.32	31.31	7.10	322.97	104.09	22.16	29.74	6.75	58.94	19.00	4.04	5.43	1.23
Crawler Tractor	1	10	9	365	364.76	187.83	32.07	50.87	7.10	32.83	16.90	2.89	4.58	0.64	5.99	3.09	0.53	0.84	0.12
DUST CONTROL AND ROAD MAINTENANCE																			
Water Tanker	7	10	11	365	339.97	109.57	23.32	31.31	7.10	261.76	84.37	17.96	24.10	5.47	47.77	15.40	3.28	4.40	1.00
Motor Grader	3	10	8	365	339.97	148.70	29.15	58.70	7.10	81.20	26.77	5.25	10.57	1.28	11.17	4.88	0.96	1.93	0.23
Crawler Tractor	1	10	9	365	364.76	187.83	32.07	50.87	7.10	32.83	16.90	2.89	4.58	0.64	5.99	3.09	0.53	0.84	0.12
Vacuum Sweeper	2	10	11	365	339.97	109.57	23.32	31.31	7.10	74.79	24.10	5.13	6.89	1.56	13.65	4.40	0.94	1.26	0.29
FINAL COVER EXCAVATION, HAULING AND SPREADING																			
Rubber-Tired Loader	1	10	7	365	364.76	187.83	37.90	31.31	7.10	25.53	13.15	2.65	2.19	0.50	4.66	2.40	0.48	0.40	0.09
Haul Truck	3	10	8	365	339.97	109.57	23.32	31.31	7.10	61.20	19.72	4.20	5.63	1.28	11.17	3.60	0.77	1.03	0.23
Crawler Tractor	1	10	9	365	364.76	187.83	32.07	50.87	7.10	32.83	16.90	2.89	4.58	0.64	5.99	3.09	0.53	0.84	0.12
Compactor	1	10	10.5	365	329.35	121.31	23.32	31.31	7.10	34.56	12.74	2.45	3.29	0.75	6.31	2.32	0.45	0.60	0.14
LINER CONSTRUCTION CLAY MATERIAL																			
Frontend Loader	1	10	7	365	364.76	187.83	37.90	31.31	7.10	25.53	13.15	2.65	2.19	0.50	4.66	2.40	0.48	0.40	0.09
Haul Truck	1	10	8	365	339.97	109.57	23.32	31.31	7.10	20.40	6.57	1.40	1.88	0.43	3.72	1.20	0.26	0.34	0.08
Crawler Tractor	1	10	9	365	364.76	187.83	32.07	50.87	7.10	32.83	16.90	2.89	4.58	0.64	5.99	3.09	0.53	0.84	0.12
Compactor	1	10	10.5	365	329.35	121.31	23.32	31.31	7.10	34.56	12.74	2.45	3.29	0.75	6.31	2.32	0.45	0.60	0.14
LINER CONSTRUCTION AGGREGATE MATERIAL																			
Frontend Loader	2	10	12	365	364.76	187.83	37.90	31.31	7.10	87.54	45.08	9.10	7.51	1.70	15.98	8.23	1.66	1.37	0.31
Haul Truck	9	10	9.5	365	339.97	109.57	23.32	31.31	7.10	290.68	93.68	19.94	26.77	6.07	53.05	17.10	3.64	4.88	1.11
Crawler Tractor	1	10	9	365	364.76	187.83	32.07	50.87	7.10	32.83	16.90	2.89	4.58	0.64	5.99	3.09	0.53	0.84	0.12
Compactor	1	10	10.5	365	329.35	121.31	23.32	31.31	7.10	34.56	12.74	2.45	3.29	0.75	6.31	2.32	0.45	0.60	0.14
MISCELLANEOUS																			
Backhoe	2	10	2.5	365	357.68	266.09	32.07	54.78	7.10	17.86	13.30	1.60	2.74	0.36	3.26	2.43	0.29	0.50	0.06
Utility Truck	3	10	5	365	339.97	109.57	23.32	31.31	7.10	51.00	16.44	3.50	4.70	1.07	9.31	3.00	0.64	0.86	0.19
Grader	1	10	8	365	339.97	148.70	29.15	58.70	7.10	20.40	8.92	1.75	3.52	0.43	3.72	1.63	0.32	0.64	0.08
									TOTAL =	4,060.0	1,540.5	303.9	416.8	83.9	740.9	281.1	55.5	76.1	15.3

Footnote:
(1) Activity levels are same levels assumed for the Proposed Project without mitigation.
(2) Emission factors from EPA's "Non-Road Engine and Vehicle Emission Study Report," 21A-2001, 11/91, with 9.5% NOx and 25.5% PM reduction for use of CARB low sulfur fuel.

A 10-3

Table A-10-3

Eagle Mountain Landfill and Recycling Center On-Highway Truck Emissions No Project Alternative Emission Factors from EMFAC7F for Class 8B Trucks			
Species	Emission Factor (g/mi)	Emissions	
		lb/day	tons/yr
Total Organic Gases (TOG)	1.98	48.02	8.76
Reactive Organic Gases (ROG)	1.90	45.97	8.39
CO	9.10	220.68	40.27
NOx	18.95	459.56	83.87
PM_{10} (Exhaust)	1.91	46.32	8.45
PM_{10} (Tire Wear)	0.66	16.01	2.92
Total PM_{10}	2.57	62.33	11.37
SO_2	0.52	12.61	2.30

Table A-10-4

Eagle Mountain Landfill and Recycling Center
Flare Station Emissions
No Project Alternative

Information Source	Emission Factors (lbs/MMBtu) NOx	CO	PM10	VOC	SOx
SCAQMD BACT (1)	0.060	N/A	N/A	N/A	N/A
SCAQMD Test Data (2)				0.022	
SCAQMD Rule 431.1 (3)					0.014
Vendor Data (4)	0.054	0.270	0.024	N/A	N/A
Puente Hills (5)	0.083	0.068	N/A	0.080	0.011
BKK (5)	0.013	0.482	0.028	0.022	0.005
Milliken (6)	0.141	0.132	N/A	0.136	N/A
Average (7) =	0.070	0.238	0.026	0.065	0.014

Maximum Landfill Gas Production Rate =	46000	scfm
	66.24	MMscf/day
Landfill Gas Heat Content (HHV) =	505	BTU/scf
Maximum Heat Input =	1394	MMBTU/hr

	NOx	CO	PM10	VOC	SOx
Emission Factors (lb/MMBTU)	0.070	0.238	0.026	0.065	0.014
Control Efficiency	0%	0%	0%	0%	0%
Emissions (lb/hr)	97.8	331.7	36.2	90.6	19.5
(lb/day)	2348.3	7961.4	869.7	2174.3	468.3
(tons/yr)	428.6	1453.0	158.7	396.8	85.5
Emissions Per Flare (g/sec)	1.54	5.22	0.57	1.43	0.31

Footnotes:
(1) From South Coast AQMD Best Available Control Technology Guidelines, January 1990.
(2) From a collection of test data compiled by the South Coast AQMD for Prima, Santiago, El Sobrante, Chiquita, and Puente Hills landfills showing NMHC contents of raw landfill gas. VOC emission factor based on raw landfill NMHC content of 13,410 ppmv and vendor guaranteed NMHC flare destruction efficiency of 98%.
(3) Based on raw landfill gas sulfur content of 40 ppmv as limited by South Coast AQMD Rule 431.1 (as amended October 2, 1992).
(4) Manufacturer's guarantee.
(5) California Air Resources Board source test, July 1986.
(6) South Coast AQMD source test, July 1988.
(7) With exception of SOx emission factor which equals Rule 431.1 limit.

Section A-11
Eagle Mountain Landfill And Recycling Center
Townsite Emissions Calculations

Table A-11-1

Eagle Mountain Landfill and Recycling Center Townsite Proposed Planning Areas and New Activities for Emission Estimation				
Area Index	Acres	Current Use	Proposed Use	Assumed New Activity
1	13	Eagle Mountain Correctional Facility	No Change	None
2	13	Kaiser Administrative Office	Commercial and Manufacturing	10 acres available for 217,800 ft^2 of commercial space
3	28	None	Outdoor Storage	No significant emissions
4	9	Planned expansion of Correctional Facility	Expansion of Correctional Facility	None not currently permitted
6	8	Community Building	Retain Building; add commercial and manufacturing	4 acres available for 87,120 ft^2 of commercial space
5	5	Two residences and 13 residential pads/foundations	15 single-family dwellings or 37 multiple dwelling units	37 multiple dwelling units
7	4	Church and recreational building	Same	None
8	11	None	Landscaped parkways and 4.7 acres of commercial use	4.7 acres available for 102,366 ft^2 of commercial space
9	29	29 existing houses and 31 pads or partial houses	60 single-family dwellings	60 new single-family dwellings
10	91	316 existing houses (112 occupied) and 19 pads or partial houses	335 single-family dwellings	223 new single-family dwellings
11	24	Waste-water treatment plant	Same	None
12	168	Open space	Same	None

Table A-11-2

Eagle Mountain Landfill and Recycling Center Emission Factors for Townsite Emissions					
Store Type	Weight	NOx	CO	PM_{10}	ROC
Commercial Stores - Area Source (lb/1000 sq ft/day)					
Fast Food	10%	0.14903	0.02592	0.00518	0.0013
Hardware Store	10%	0.03718	0.00647	0.00129	0.00032
Medical Office	10%	0.02773	0.00482	0.00096	0.00024
Restaurant	10%	0.14903	0.02592	0.0518	0.0013
Small Shopping Center	45%	0.03718	0.00647	0.00129	0.00032
Supermarket	15%	0.16195	0.02816	0.00563	0.00141
Overall Area Factor		0.07732	0.01345	0.00735	0.00067
Emission Factor for Business Park (lb/1000 sq ft/day)					
Area Source		0.02773	0.00482	0.00096	0.00024
Final Emission Factors for Commercial (Stores and Office Space - lb/1000 sq ft/day)					
Final Commercial Emission Factors		**0.0525**	**0.009**	**0.004**	**0.0005**
Single Dwelling Unit Emission Factors (lb/day/dwelling unit)					
Mobile Source Activities		0.23	3.32	0.02	0.27
Area Source Activities		0.01916	0.00333	0.00067	0.00017
Final Single Dwelling Emission Factors		**0.24916**	**3.32333**	**0.02067**	**0.27017**
Multiple Dwelling Unit Emission Factors (lb/day/dwelling unit)					
Mobile Source Activities		0.14	2.11	0.02	0.17
Area Source Activities		0.02203	0.00333	0.00067	0.00017
Final Multiple Dwelling Emission Factors		**0.16203**	**2.11333**	**0.02067**	**0.17017**

Table A-11-3
Townsite Expansion Emission Calculations

Percentof commercial areas built	50%
To get ft² multiply acres by	43,560
Developed square feet per acre	21,780

Emission Factor for Composite Commercial Stores - Mobile Source (lb/1000 sq ft/day)

		NOx	CO	PM10	ROC	SOx
Fast Food	10%	1.91	117.77	1.62	16.02	
Hardware Store	10%	0.41	15.58	0.19	1.99	
Medical Office	10%	0.39	8.2	0.08	0.91	
Restaurant	10%	1.11	23.17	0.23	2.56	
Small Shopping Center	45%	0.27	10.31	0.13	1.32	
Supermarket	15%	1.27	36.56	0.42	4.43	
Overall Factor		0.69	26.60	0.33	3.41	

Emission Factor for Composite Commercial Stores - Area Source (lb/1000 sq ft/day)

Fast Food	10%	0.14903	0.02592	0.00518	0.0013
Hardware Store	10%	0.03718	0.00647	0.00129	0.00032
Medical Office	10%	0.02773	0.00482	0.00096	0.00024
Restaurant	10%	0.14903	0.02592	0.0518	0.0013
Small Shopping Center	45%	0.03718	0.00647	0.00129	0.00032
Supermarket	15%	0.16195	0.02816	0.00563	0.00141
Overall Factor		0.07732	0.01345	0.00735	0.00067
Are mobile sources considered?		No	No	No	No
Total Stationary Plus Mobile		0.07732	0.01345	0.00735	0.00067

Emission Factor for Business Park (lb/1000 sq ft/day)

Mobile Source	0.23	3.94	0.03	0.4
Area Source	0.02773	0.00482	0.00096	0.00024
Total	0.02773	0.00482	0.00096	0.00024

Average Emission Factor for Stores and Office Space (lb/1000 sq ft/day)

	0.0525	0.0091	0.0042	0.0005

Single Dwelling Unit Emission Factors (lb/day/dwelling unit)

Mobile Source Operation	0.23	3.32	0.02	0.27	0.025
Area Source Operation	0.01916	0.00333	0.00067	0.00017	
Total	0.24916	3.32333	0.02067	0.27017	0.025

Multiple Dwelling Unit Emission Factors (lb/day/dwelling unit)

Mobile Source Operation	0.14	2.11	0.02	0.17	0.017
Area Source Operation	0.02203	0.00333	0.00067	0.00017	
Total	0.16203	2.11333	0.02067	0.17017	0.017

Townsite Emissions in lb/day		NOx	CO	PM10	ROC	SOx
Commercial Square Footage	407,286	21.4	3.7	1.7	0.2	0.0
Multiple Dwelling Units	37	6.00	78.19	0.76	6.30	0.63
Single Dwelling Units	283	70.51	940.50	5.85	76.46	7.08
Dwelling Unit Emissions		76.51	1,018.70	6.61	82.75	7.70
Total Townsite Emissions		97.9	1,022.4	8.3	82.9	7.7

Townsite Emissions in tons/year

Commercial Square Footage	407,286	3.9	0.7	0.3	0.0	0.0
Multiple Dwelling Units	37	1.1	14.3	0.1	1.1	0.1
Single Dwelling Units	283	12.9	171.6	1.1	14.0	1.3
Dwelling Unit Emissions		13.96	185.91	1.21	15.10	1.41
Total Townsite Emissions		17.9	186.6	1.5	15.1	1.4
Townsite Emissions (g/s)		0.51	5.37	0.04	0.44	0.04

Section A-12
Eagle Crest Energy Company Without Mitigation
Emissions Calculations

EMISSION ANALYSIS 12/06/95

Firm: MRC Phase: Construction
Project: Eagle Crest Energy Company Alternative: Unmitigated

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Well Drilling	150	900	ft drilled	0.455	lb/50' hole	0	1.4	8.2	lb PM10

Assumptions:
- 1 well drilled at a time
- 8 hr/day - drilling schedule (assumed)
- 1.30 lb 30um/hole, Western Coal, overburden, 8.24-8
- 0.35 lb PM10/lb TSP
- 50 ft hole depth for Western Coal Mining
- 300 ft hole depth for project wells
- 150 ft /day drilling rate for project wells
- 3 wells drilled for the project

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Waterline Trenching	360	93600	tons transferred	0.0203	lb/ton	0	7.3	1900.08	lb PM10

Assumptions:
- 25 ft/hr trenching rate (assumed)
- 8 hr/day operation (assumed)
- 2.0% Average soil moisture content (Cotton Tillage Report, Coates, 1995)
- 9.3 mph average wind velocity (ARB, Desert Center)
- 5.0 ft trench width (assumed)
- 8.0 ft trench depth (assumed)
- 90 lb/ft2 - in bank (estimated)
- 260 day/yr operation (assumed)
- 67500 ft - total pipeline length (Figure 3-3, EMEC A/L)

Calculated Values:
- 0.0203 lb PM10/ton material transfer emission factor (Gap Filling PM10 Emission Factors, 2/88, p. 28)
- 1,000 ft3/hr soil transfer rate
- 45.0 to/hr soil transfer rate
- 360.0 ton/day soil transfer rate
- 338 days to complete trenching
- 93600 ton/yr soil transfer rate

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Tunnel Portal Construction	2500	50000	ft2 surface area blasted	0.0004	lb/ft2	0	0.9	18.4	lb PM10
	800	16000	tons of rubble loaded out	0.0025	lb/ton	0	2.0	40.2	lb PM10
					Subtotal		2.9	58.6	lb PM10

Assumptions:
- 2500 ft2 per blast surface area
- 100 ton/hr rubble loaded onto trucks
- 2.0% Average soil moisture content (Cotton Tillage Report, Coates, 1995)
- 9.3 mph average wind velocity (ARB, Desert Center)
- 8 hr/day loadout schedule
- 20.0 day/yr preparation schedule

Calculated Values:
- 232 m2 per blast surface area
- 0.9 lb PM10/blast, Western Coal, coal or overburden, 8.24-5 (9/88)
- 2.51E-03 lb/ton, Aggregate Handling, 11.2.3-3 (1988),
- 0.25 lb PM10/hr- rubble loadout
- 2.01 lb PM10/day - rubble loadout
- 40.15 lb PM10/yr - portal preparation
- 800 ton/day - rubble loadout
- 16000 ton/yr - rubble loadout

Firm: MRC Phase: Construction
Project: Eagle Crest Energy Company Alternative: Unmitigated

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Tunnel Drilling	240	55800	ft	0	lb/hr	0	0.0	0.0	lb PM10

Assumptions:
- 0.0 lb PM10/hr - electric-powered rock-boring machine
- 10.0 ft/hr advance rate of boring machine (estimated - Standard Handbook for Civil Engineering, p. 20-32)
- 55800 ft - total tunnel length (EMEC A/L, Fig. E2-8)
- 24.0 hr/day - boring schedule (assumed)

Calculated Values:
- 5580 hr boring
- 232.5 day/yr - boring schedule

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Tunnel Spoil Transfer	5089	1323239	ton	0.0014	lb/ton	0	7.1	1841.4	lb PM10

Assumptions:
- 20.00 ft diameter tunnels (EMEC A/L, p. E.8-7)
- 135 lb/ft3 - rock density (assumed)
- 5.0% moisture content in bored rock (assumed)
- 9.3 mph average wind velocity (ARB, Desert Center)

Calculated Values:
- 3141.6 ft3/hr - rock bored
- 212.1 ton/hr - rock bored
- 6.96E-04 lb PM10/ton, Aggregate Handling, 11.2.3-3 (1988),
- 0.15 lb PM10/hr - rock transfer to truck bin
- 0.15 lb PM10/hr - rock transfer to trucks
- 0.30 lb PM10/hr - total rock transfer
- 7.08 lb PM10/day - total rock transfer
- 1841.35 lb PM10/yr - total rock transfer

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Tunnel Spoil Placement	5089	1323239	ton	0.0020	lb/ton	0	10.2	2639.2	lb PM10

Assumptions:
- 0.0007 lb PM10/ton, Aggregate Handling, 11.2.3-3 (1988),
- 8 hr/day - grader operation (assumed)
- 260 day/yr - grader operation (assumed)
- 3 mph - grader speed (assumed)
- 0.2754 lb PM10/VMT, Western Coal, Grading, 8.24-5

Calculated Values:
- 5089.4 ton/day - tunnel spoil dumped by truck
- 1323239 ton/yr - tunnel spoil dumped by truck
- 3.54 lb PM10/day - truck dump
- 920.68 lb PM10/yr - truck dump
- 24 mi/day - grader travel
- 0.0047 mi/ton - grader spreading rate
- 0.0013 lb PM10/ton
- 6.61 lb PM10/day - grader operation
- 1718.5 lb PM10/yr - grader operation

EMISSION ANALYSIS

12/06/95

Firm: MRC
Project: Eagle Crest Energy Company

Phase: Construction
Alternative: Unmitigated

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Transmission Tower Erecti	360	93600	tons	0.0203	lb/ton	0	7.3	1900.1	lb PM10

Assumptions:
- Tower pad construction produces as much PM10 emission as waterline trenching.
- 8 hr/day - construction schedule (assumed)
- 260 day/yr operation (assumed)

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Access Road Construction	0.05	2.84	road-miles constructed	66972.3	lb/road-mile constructed	0	3193.3	190262.1	lb PM10

Assumptions:
- 15000 ft access road length
- 60 ft - disturbed area width
- 9.58 ton PM10/acre-yr (Construction Particulate Analysis, Harding Lawson, 6/94, Table A-2, light-duty vehicle traffic on paved roads ignored)
- 124 day/yr - operation schedule of ADOT project studied by HLA
- 86 acres/project - project size of ADOT project studied by HLA
- 8 hr/day - construction schedule (assumed)

Calculated Values:
- 20.7 acres - total disturbed area
- 7.3 acre/mi - disturbed area rate
- 248 day/project - project life of ADOT project studied by HLA
- 0.35 acres/day - equivalent project completion rate of ADOT project
- 0.0477 mi/day - equivalent project completion rate of EMEC road construction phase
- 59.6 day/project - life of EMEC road construction phase
- 154.6 lb PM10/acre-day (Construction Particulate Analysis, HLA)
- 3193.3 lb PM10/day
- 95.1 ton PM10/yr
- 66972.3 lb PM10/mi road constructed

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Haul Road Use	468.4	102,791	VMT	NA	lb/VMT	0	1622.7	248445.0	lb PM10

Assumptions:
- 6.0% silt content (Air Quality Impacts of Eagle Mountain Project, SR, 8/90, Table 27)
- 20 day/yr precipitation >0.01 in. (AP-42, Fig. 13.2.2-1)

Activity	Speed (mph)	Weight (tons)	Wheels (#)	Emission Factor Max. Daily (lb/VMT)	Emission Factor Avg. Annual (lb/VMT)	Trip Length (mi)	Trip Frequency (trips/day)	Trip Frequency (trips/yr)
Tunnel Portal Concrete Pour	30	31	10	8.51	8.05	6.1	10	100
Tunnel Portal Rubble Transfer	30	27.5	10	7.83	7.40	0.5	32	640
Tunnel Spoil Transfer	30	27.5	10	7.83	7.40	0.5	204	52930
Crew Transport	30	1	4	0.49	0.46	5.0	50	13000
Equipment Servicing	30	4	6	1.57	1.49	5.0	8	2080

Activity	(VMT/day)	(VMT/yr)	Emission Rate (lb/day)	Emission Rate (lb/yr)	Number of Trucks
Tunnel Portal Concrete Pour	60.6	606.1	516.0	4877.2	2
Tunnel Portal Rubble Transfer	16.0	320.0	125.3	2368.0	1
Tunnel Spoil Transfer	101.8	26464.8	796.9	195840.2	2
Crew Transport	250.0	65000.0	121.7	29898.1	25
Equipment Servicing	40.0	10400.0	62.9	15461.5	2

Firm: MRC
Project: Eagle Crest Energy Company
Phase: Construction
Alternative: Unmitigated

OTHER POLLUTANTS

Equipment or Activity	Power Rating (hp)	Load Factor (%)	Power Demand (hp)	Emission Factor PM	NOx	VOC	SO2	CO	Units
Welldrilling Rig	209	75%	157	0.82	9.14	1.4	0.18	6.8	gm/hp-hr
Waterline Trencher	71	38%	27	0.82	9.14	1.4	0.18	6.8	gm/hp-hr
Portal Hardrock Drill	209	75%	157	0.82	9.14	1.4	0.18	6.8	gm/hp-hr
Frontend Loader	175	54%	95	0.97	9.32	0.8	0.18	4.8	gm/hp-hr
Rubble Haul Truck	350	25%	88	0.6	8.69	0.8	0.18	2.8	gm/hp-hr
Portal Transit Mixer	NA	NA	NA	2.57	18.95	1.98	0.52	9.1	gm/VMT
Tunnel Borer Generator	2600	75%	1950	0.82	9.32	1.3	0.18	4.8	gm/hp-hr
Spoil Haul Truck	350	25%	88	0.6	8.69	0.8	0.18	2.8	gm/hp-hr
Spoil Grader	147	54%	79	0.75	8.69	1.5	0.18	3.8	gm/hp-hr
Tower Excavator	71	38%	27	0.82	9.14	1.4	0.18	6.8	gm/hp-hr
Road Scraper	290	60%	174	0.82	9.32	1.3	0.18	4.8	gm/hp-hr
Road Grader	147	54%	79	0.75	8.69	1.5	0.18	3.8	gm/hp-hr
Road Roller	99	59%	58	0.6	8.42	0.8	0.18	3.1	gm/hp-hr
Utility Vehicle	NA	NA	NA	2.57	18.95	1.98	0.52	9.1	gm/VMT
Crew Vehicles	NA	NA	NA	2.57	18.95	1.98	0.52	9.1	gm/VMT

Equipment or Activity	Process Rate Max. Daily	Units		Emission Rate PM	NOx	VOC	SO2	CO	Units
Welldrilling Rig	8	hr		2.3	25.3	3.9	0.5	18.8	lb/day
Waterline Trencher	8	hr		0.4	4.3	0.7	0.1	3.2	lb/day
Portal Hardrock Drill	8	hr		2.3	25.3	3.9	0.5	18.8	lb/day
Frontend Loader	8	hr		1.6	15.5	1.3	0.3	8.0	lb/day
Rubble Haul Truck	8	hr		0.9	13.4	1.2	0.3	4.3	lb/day
Portal Transit Mixer	60.6	VMT		0.3	2.5	0.3	0.1	1.2	lb/day
Tunnel Borer Generator	24	hr		84.6	961.6	134.1	18.6	495.2	lb/day
Spoil Haul Truck	48	hr		5.6	80.5	7.4	1.7	25.9	lb/day
Spoil Grader	8	hr		1.1	12.2	2.1	0.3	5.3	lb/day
Tower Excavator	8	hr		0.4	4.3	0.7	0.1	3.2	lb/day
Road Scraper	8	hr		2.5	28.6	4.0	0.6	14.7	lb/day
Road Grader	8	hr		1.1	12.2	2.1	0.3	5.3	lb/day
Road Roller	8	hr		0.6	8.7	0.8	0.2	3.2	lb/day
Utility Vehicle	40	VMT		0.2	1.7	0.2	0.0	0.8	lb/day
Crew Vehicles	250	VMT		1.4	10.4	1.1	0.3	5.0	lb/day
			Subtotal	105.2	1206.5	163.7	23.6	613.2	**lb/day**

Equipment or Activity	Process Rate Annual	Units		Emission Rate PM	NOx	VOC	SO2	CO	Units
Welldrilling Rig	48	hr		13.6	151.6	23.2	3.0	112.8	lb/yr
Waterline Trencher	2080	hr		101.4	1130.8	173.2	22.3	841.3	lb/yr
Portal Hardrock Drill	32	hr		9.1	101.1	15.5	2.0	75.2	lb/yr
Frontend Loader	80	hr		16.2	155.3	13.3	3.0	80.0	lb/yr
Rubble Haul Truck	80	hr		9.3	134.1	12.3	2.8	43.2	lb/yr
Portal Transit Mixer	606.1	VMT		3.4	25.3	2.6	0.7	12.2	lb/yr
Tunnel Borer Generator	5580	hr		19670.2	223569.0	31184.5	4317.9	115142.9	lb/yr
Spoil Haul Truck	11160	hr		1291.7	18707.6	1722.2	387.5	6027.8	lb/yr
Spoil Grader	2080	hr		273.0	3163.2	546.0	65.5	1383.2	lb/yr
Tower Excavator	2080	hr		101.4	1130.8	173.2	22.3	841.3	lb/yr
Road Scraper	238.3	hr		75.0	852.0	118.8	16.5	438.8	lb/yr
Road Grader	476.6	hr		62.6	724.9	125.1	15.0	317.0	lb/yr
Road Roller	238.3	hr		18.4	258.4	24.6	5.5	95.1	lb/yr
Utility Vehicle	10400	VMT		58.9	434.5	45.4	11.9	208.6	lb/yr
Employee Vehicles	65000	VMT		368.3	2715.5	283.7	74.5	1304.0	lb/yr
			Subtotal	22072.5	253254.1	34463.8	4950.3	126923.3	**lb/yr**

EMISSION ANALYSIS

12/06/95

Firm: MRC
Project: Eagle Crest Energy Company

Phase: Construction
Alternative: Unmitigated

SUMMARY: Daily Emissions

Equipment or Activity	Fugitive PM10	Exhaust PM10	Total PM10	NOx	VOC	SO2	CO	Units
Well Drilling	1.4		1.4					
Welldrilling Rig		2.3	2.3	4.5	6.8	11.3	18.1	lb/day
Waterline Trenching	7.3		7.3					lb/day
Waterline Trencher		0.4	0.4	0.8	1.2	2.0	3.1	lb/day
Tunnel Portal Construction	2.9		2.9					lb/day
Portal Hardrock Drill		2.3	2.3	4.5	6.8	11.3	18.1	lb/day
Frontend Loader		1.6	1.6	3.2	4.9	8.1	12.9	lb/day
Rubble Haul Truck		0.9	0.9	1.9	2.8	4.6	7.4	lb/day
Portal Transit Mixer		0.3	0.3	0.7	1.0	1.7	2.7	lb/day
Tunnel Drilling	0.0		0.0					lb/day
Tunnel Borer Generator		84.6	84.6	169.2	253.8	423.0	676.8	lb/day
Tunnel Spoil Transfer	7.1		7.1					lb/day
Spoil Haul Truck		5.6	5.6	11.1	16.7	27.8	44.4	lb/day
Tunnel Spoil Placement	10.2		10.2					lb/day
Spoil Grader		1.1	1.1	2.1	3.2	5.3	8.4	lb/day
Transmission Tower Erection	7.3		7.3					lb/day
Tower Excavator		0.4	0.4	0.8	1.2	2.0	3.1	lb/day
Access Road Construction	3193.3		3193.3					lb/day
Road Scraper		2.5	2.5	5.0	7.5	12.6	20.1	lb/day
Road Grader		1.1	1.1	2.1	3.2	5.3	8.4	lb/day
Road Roller		0.6	0.6	1.2	1.9	3.1	4.9	lb/day
Haul Road Use	1622.7		1622.7					lb/day
Utility Vehicle		0.2	0.2	0.5	0.7	1.1	1.8	lb/day
Crew Vehicles		1.4	1.4	2.8	4.2	7.1	11.3	lb/day
TOTAL			4957.4	210.5	315.7	526.2	841.9	lb/day

Annual Emissions

Equipment or Activity	Fugitive PM10	Exhaust PM10	Total PM10	NOx	VOC	SO2	CO	Units
Well Drilling	8.2		8.2					
Welldrilling Rig		13.6	13.6	151.6	23.2	3.0	112.8	lb/yr
Waterline Trenching	1900.1		1900.1					lb/yr
Waterline Trencher		101.4	101.4	1130.8	173.2	22.3	841.3	lb/yr
Tunnel Portal Construction	58.6		58.6					lb/yr
Portal Hardrock Drill		9.1	9.1	101.1	15.5	2.0	75.2	lb/yr
Frontend Loader		16.2	16.2	155.3	13.3	3.0	80.0	lb/yr
Rubble Haul Truck		9.3	9.3	134.1	12.3	2.8	43.2	lb/yr
Portal Transit Mixer		3.4	3.4	25.3	2.6	0.7	12.2	lb/yr
Tunnel Drilling	0.0		0.0					lb/yr
Tunnel Borer Generator		19670.2	19670.2	223569.0	31184.5	4317.9	115142.9	lb/yr
Tunnel Spoil Transfer	1841.4		1841.4					lb/yr
Spoil Haul Truck		1291.7	1291.7	18707.6	1722.2	387.5	6027.8	lb/yr
Tunnel Spoil Placement	2639.2		2639.2					lb/yr
Spoil Grader		273.0	273.0	3163.2	546.0	65.5	1383.2	lb/yr
Transmission Tower Erection	1900.1		1900.1					lb/yr
Tower Excavator		101.4	101.4	1130.8	173.2	22.3	841.3	lb/yr
Access Road Construction	190262.1		190262.1					lb/yr
Road Scraper		75.0	75.0	852.0	118.8	16.5	438.8	lb/yr
Road Grader		62.6	62.6	724.9	125.1	15.0	317.0	lb/yr
Road Roller		18.4	18.4	258.4	24.6	5.5	95.1	lb/yr
Haul Road Use	248445.0		248445.0					lb/yr
Utility Vehicle		58.9	58.9	434.5	45.4	11.9	208.6	lb/yr
Crew Vehicles		368.3	368.3	2715.5	283.7	74.5	1304.0	lb/yr
TOTAL			469127.0	253254.1	34463.8	4950.3	126923.3	lb/yr
			234.6	126.6	17.2	2.5	63.5	ton/yr

Firm: MRC Phase: **Operation**
Project: Eagle Crest Energy Company Alternative: **Unmitigated**

Equipment or Activity	Process Rate Max. Daily	Annual	Units
Energy Supply to Pump	20520	4814871	MWH

	PM	NOx	ROG	SO2	CO	Units
Emission Factor	0.05	2.93	0.62	0.006	0.49	lb/MW-hr
Emission Rate	1026	60,124	12,722	123	10,055	lb/day
	240744	14,107,573	2,985,220	28,889	2,359,287	lb/yr

Assumption
1140 MW - pump input (EMEC A/L, V.1, p. A-10)
81 hr/wk - pumping schedule (EMEC A/L, V.1, p. A-1)
18 hr/day - max. pumping schedule (EMEC A/L, V.1, p. A-10)
5.0 lb PM10/MMft3 (AP-42, Table 1.4-1)
0.6 lb SO2/MMft3 (AP-42, Table 1.4-2)
(Emission factors for NOx, ROG, and CO from backup to "Electric Vehicles and Powerplant Emissions", Angela Tanghetti, CEC, 6/95)
1000 BTU/ft3 - heat content of natural gas (assumed)
10,000,000 BTU/MW-hr (assumed)
92% transmission efficiency (assumed)

Calculated Values:
4224 hr/yr - pumping schedule
20520 MW-hr/day - pump energy consumption
4814871 MW-hr/yr - pump energy consumption

Equipment or Activity	Process Rate Max. Daily	Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Annual	Units
Access Road Use	35.0	9,100	VMT	NA	lb/VMT	50%	13.9	3427.6	lb PM10

Assumptions
6.0% silt content (Air Quality Impacts of Eagle Mountain Project, SR, 8/90, Table 27)
20 day/yr precipitation >0.01 in. (AP-42, Fig. 13.2.2-1)

Activity	Speed (mph)	Weight (tons)	Wheels (#)	Emission Factor Max. Daily (lb/VMT)	Avg. Annual (lb/VMT)	Trip Length (mi)	Trip Frequency (trips/day)	(trips/yr)
Crew Transport	30	1	4	0.49	0.46	5.0	5	1300
Equipment Servicing	30	4	6	1.57	1.49	5.0	2	520

Activity	(VMT/day)	(VMT/yr)	Emission Rate (lb/day)	(lb/yr)	Number of Trucks
Crew Transport	25.0	6500.0	12.2	2989.8	2
Equipment Servicing	10.0	2600.0	15.7	3865.4	1

Firm: MRC
Project: Eagle Crest Energy Company
Phase: Operation
Alternative: Unmitigated

OTHER POLLUTANTS

Equipment or Activity	Power Rating (hp)	Load Factor (%)	Power Demand (hp)	Emission Factor PM	NOx	VOC	SO2	CO	Units
Utility Vehicle	NA	NA	NA	2.57	18.95	1.98	0.52	9.1	gm/VMT
Crew Vehicles	NA	NA	NA	2.57	18.95	1.98	0.52	9.1	gm/VMT

Equipment or Activity	Process Rate Max. Daily	Units		Emission Rate PM	NOx	VOC	SO2	CO	Units
Utility Vehicle	10	VMT		0.2	1.7	0.2	0.0	0.8	lb/day
Crew Vehicles	25	VMT		1.4	10.4	1.1	0.3	5.0	lb/day
			Subtotal	1.6	12.1	1.3	0.3	5.8	lb/day

Equipment or Activity	Process Rate Annual	Units		Emission Rate PM	NOx	VOC	SO2	CO	Units
Utility Vehicle	2600	VMT		58.9	434.5	45.4	11.9	208.6	lb/yr
Crew Vehicles	6500	VMT		368.3	2715.5	283.7	74.5	1304.0	lb/yr
			Subtotal	427.2	3150.0	329.1	86.4	1512.7	lb/yr

EMISSION ANALYSIS 01/31/96

Firm: MRC Phase: **Operation**
Project: Eagle Crest Energy Company Alternative: **Unmitigated**

SUMMARY **Daily Emissions**

Equipment or Activity	Fugitive PM10	Exhaust PM10	Total PM10	NOx	VOC	SO2	CO	Units
Energy Supply to Pump	NA	NA	1026.0	60123.6	12722.4	123.1	10054.8	lb/day
Access Road Use	13.9		13.9					lb/day
Utility Vehicle		0.2	0.2	0.5	0.7	1.1	1.8	lb/day
Crew Vehicles		1.4	1.4	2.8	4.2	7.1	11.3	lb/day
TOTAL ONSITE EMISSIONS			15.6	3.3	4.9	8.2	13.1	lb/day
TOTAL OFFSITE EMISSIONS			1026.0	60123.6	12722.4	123.1	10054.8	lb/day
GRAND TOTAL			1041.6	60126.9	12727.3	131.3	10067.9	**lb/day**
			0.521	30.1	6.4	0.1	5.0	**ton/day**

Annual Emissions

Equipment or Activity	Fugitive PM10	Exhaust PM10	Total PM10	NOx	VOC	SO2	CO	Units
Energy Supply to Pump	NA	NA	120.4	7053.8	1492.6	14.4	1179.6	ton/yr
Access Road Use	1.7		1.7					ton/yr
Utility Vehicle		0.0	0.0	0.2	0.0	0.0	0.1	ton/yr
Crew Vehicles		0.2	0.2	1.4	0.1	0.0	0.7	ton/yr
TOTAL ONSITE EMISSIONS			1.9	1.6	0.2	0.0	0.8	ton/yr
TOTAL OFFSITE EMISSIONS			120.4	7053.8	1492.6	14.4	1179.6	ton/yr
GRAND TOTAL			122.3	7055.4	1492.8	14.5	1180.4	**ton/yr**

Section A-13
Eagle Crest Energy Company With Mitigation
Emissions Calculations

EMISSION ANALYSIS

12/06/95

Firm: MRC
Project: Eagle Crest Energy Company

Phase: Construction
Alternative: Mitigated

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Well Drilling	150	900	ft drilled	0.455	lb/50' hole	90%	0.1	0.8	lb PM10

Assumptions:
- 1 well drilled at a time
- 8 hr/day - drilling schedule (assumed)
- 1.30 lb 30um/hole, Western Coal, overburden, 8.24-8
- 0.35 lb PM10/lb TSP
- 50 ft hole depth for Western Coal Mining
- 300 ft hole depth for project wells
- 150 ft /day drilling rate for project wells
- 3 wells drilled for the project
- 90% control efficiency from foam use at drill hole (Control Techniques for PM from Stat. Sources, PEDCo, 9/82, p. 5-14)

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Waterline Trenching	360	93600	tons transferred	0.0203	lb/ton	50%	3.7	950.04	lb PM10

Assumptions:
- 25 ft/hr trenching rate (assumed)
- 8 hr/day operation (assumed)
- 2.0% Average soil moisture content (Cotton Tillage Report, Coates, 1995)
- 9.3 mph average wind velocity (ARB, Desert Center)
- 5.0 ft trench width (assumed)
- 8.0 ft trench depth (assumed)
- 90 lb/ft2 - in bank (estimated)
- 260 day/yr operation (assumed)
- 67500 ft - total pipeline length (Figure 3-3, EMEC A/L)
- 50% control efficiency from water application (Control Techniques for PM from Stat. Sources, PEDCo, 9/82, p. 5-14)

Calculated Values:
- 0.0203 lb PM10/ton material transfer emission factor (Gap Filling PM10 Emission Factors, 2/88, p. 28)
- 1,000 ft3/hr soil transfer rate
- 45.0 to/hr soil transfer rate
- 360.0 ton/day soil transfer rate
- 338 days to complete trenching
- 93600 ton/yr soil transfer rate

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Tunnel Portal Construction	2500	50000	ft2 surface area blasted	0.0004	lb/ft2	50%	0.5	9.2	lb PM10
	800	16000	tons of rubble loaded out	0.0025	lb/ton	50%	1.0	20.1	lb PM10
					Subtotal		1.5	29.3	lb PM10

Assumptions:
- 2500 ft2 per blast surface area
- 100 ton/hr rubble loaded onto trucks
- 2.0% Average soil moisture content (Cotton Tillage Report, Coates, 1995)
- 9.3 mph average wind velocity (ARB, Desert Center)
- 8 hr/day loadout schedule
- 20.0 day/yr preparation schedule
- 50% control efficiency from water application (Control Techniques for PM from Stat. Sources, PEDCo, 9/82, p. 5-14)

Calculated Values:
- 232 m2 per blast surface area
- 0.9 lb PM10/blast, Western Coal, coal or overburden, 8.24-5 (9/88)
- 2.51E-03 lb/ton, Aggregate Handling, 11.2.3-3 (1988),
- 0.25 lb PM10/hr- rubble loadout
- 2.01 lb PM10/day - rubble loadout
- 40.15 lb PM10/yr - portal preparation
- 800 ton/day - rubble loadout
- 16000 ton/yr - rubble loadout

Firm: MRC Phase: Construction
Project: Eagle Crest Energy Company Alternative: Mitigated

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Tunnel Drilling	240	55800	ft	0	lb/hr	0%	0.0	0.0	lb PM10

Assumptions:
- 0.0 lb PM10/hr - electric-powered rock-boring machine
- 10.0 ft/hr advance rate of boring machine (estimated - Standard Handbook for Civil Engineering, p. 20-32)
- 55800 ft - total tunnel length (EMEC A/L, Fig. E2-8)
- 24.0 hr/day - boring schedule (assumed)

Calculated Values:
- 5580 hr boring
- 232.5 day/yr - boring schedule

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Tunnel Spoil Transfer	5089	1323239	ton	0.0014	lb/ton	25%	5.3	1381.0	lb PM10

Assumptions:
- 20.00 ft diameter tunnels (EMEC A/L, p. E.8-7)
- 135 lb/ft3 - rock density (assumed)
- 5.0% moisture content in bored rock (assumed)
- 9.3 mph average wind velocity (ARB, Desert Center)
- 25% control effieicncy for partial enclosure (Fugitive Dust Control Technology, Orlemann, 1983, p. 139)

Calculated Values:
- 3141.6 ft3/hr - rock bored
- 212.1 ton/hr - rock bored
- 6.96E-04 lb PM10/ton, Aggregate Handling, 11.2.3-3 (1988),
- 0.15 lb PM10/hr - rock transfer to truck bin
- 0.15 lb PM10/hr - rock transfer to trucks
- 0.30 lb PM10/hr - total rock transfer
- 7.08 lb PM10/day - total rock transfer
- 1841.35 lb PM10/yr - total rock transfer

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Tunnel Spoil Placement	5089	1323239	ton	0.0020	lb/ton	33%	6.8	1779.9	lb PM10

Assumptions:
- 0.0007 lb PM10/ton, Aggregate Handling, 11.2.3-3 (1988),
- 8 hr/day - grader operation (assumed)
- 260 day/yr - grader operation (assumed)
- 3 mph - grader speed (assumed)
- 0.2754 lb PM10/VMT, Western Coal, Grading, 8.24-5
- 0% control efficiency for truck dump emissions
- 50% control efficiency from water application (Control Techniques for PM from Stat. Sources, PEDCo, 9/82, p. 5-14)

Calculated Values:
- 5089.4 ton/day - tunnel spoil dumped by truck
- 1323239 ton/yr - tunnel spoil dumped by truck
- 3.54 lb PM10/day - truck dump
- 920.68 lb PM10/yr - truck dump
- 24 mi/day - grader travel
- 0.0047 mi/ton - grader spreading rate
- 0.0013 lb PM10/ton
- 6.61 lb PM10/day - grader operation
- 1718.5 lb PM10/yr - grader operation
- 33% composite control efficiency

EMISSION ANALYSIS 12/06/95

Firm: MRC Phase: Construction
Project: Eagle Crest Energy Company Alternative: Mitigated

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Transmission Tower Erecti	360	93600	tons	0.0203	lb/ton	50%	3.7	950.0	lb PM10

Assumptions:
- Tower pad construction produces as much PM10 emission as waterline trenching.
- 8 hr/day - construction schedule (assumed)
- 260 day/yr operation (assumed)
- 50% control efficiency from water application (Control Techniques for PM from Stat. Sources, PEDCo, 9/82, p. 5-14)

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Access Road Construction	0.05	2.84	road-miles constructed	66972.3	lb/road-mile constructed	50%	1596.7	95131.0	lb PM10

Assumptions:
- 15000 ft access road length
- 60 ft - disturbed area width
- 9.58 ton PM10/acre-yr (Construction Particulate Analysis, Harding Lawson, 6/94, Table A-2, light-duty vehicle traffic on paved roads ignored)
- 124 day/yr - operation schedule of ADOT project studied by HLA
- 86 acres/project - project size of ADOT project studied by HLA
- 8 hr/day - construction schedule (assumed)
- 50% control efficiency from water application (Control Techniques for PM from Stat. Sources, PEDCo, 9/82, p. 5-14)

Calculated Values:
- 20.7 acres - total disturbed area
- 7.3 acre/mi - disturbed area rate
- 248 day/project - project life of ADOT project studied by HLA
- 0.35 acres/day - equivalent project completion rate of ADOT project
- 0.0477 mi/day - equivalent project completion rate of EMEC road construction phase
- 59.6 day/project - life of EMEC road construction phase
- 154.6 lb PM10/acre-day (Construction Particulate Analysis, HLA)
- 3193.3 lb PM10/day
- 95.1 ton PM10/yr
- 66972.3 lb PM10/mi road constructed

Equipment or Activity	Process Rate Max. Daily	Process Rate Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Emission Rate Annual	Units
Haul Road Use	468.4	102,791	VMT	NA	lb/VMT	95%	81.1	12422.2	lb PM10

Assumptions:
- 6.0% silt content (Air Quality Impacts of Eagle Mountain Project, SR, 8/90, Table 27)
- 20 day/yr precipitation >0.01 in. (AP-42, Fig. 13.2.2-1)

Activity	Speed (mph)	Weight (tons)	Wheels (#)	Emission Factor Max. Daily (lb/VMT)	Emission Factor Avg. Annual (lb/VMT)	Trip Length (mi)	Trip Frequency (trips/day)	Trip Frequency (trips/yr)
Tunnel Portal Concrete Pour	30	31	10	8.51	8.05	6.1	10	100
Tunnel Portal Rubble Transfer	30	27.5	10	7.83	7.40	0.5	32	640
Tunnel Spoil Transfer	30	27.5	10	7.83	7.40	0.5	204	52930
Crew Transport	30	1	4	0.49	0.46	5.0	50	13000
Equipment Servicing	30	4	6	1.57	1.49	5.0	8	2080

Activity	(VMT/day)	(VMT/yr)	Emission Rate (lb/day)	Emission Rate (lb/yr)	Number of Trucks
Tunnel Portal Concrete Pour	60.6	606.1	516.0	4877.2	2
Tunnel Portal Rubble Transfer	16.0	320.0	125.3	2368.0	1
Tunnel Spoil Transfer	101.8	26464.8	796.9	195840.2	2
Crew Transport	250.0	65000.0	121.7	29898.1	25
Equipment Servicing	40.0	10400.0	62.9	15461.5	2

95% control efficiency from MgCl + watering (Fugitive Dust Controlfor Haul Roads, BuMn, 1987, p. 11)

EMISSION ANALYSIS 12/06/95

Firm: MRC Phase: Construction
Project: Eagle Crest Energy Company Alternative: Mitigated

OTHER POLLUTANTS

Equipment or Activity	Power Rating (hp)	Load Factor (%)	Power Demand (hp)	Emission Factor PM	NOx	VOC	SO2	CO	Units
Welldrilling Rig	209	75%	157	0.82	9.14	1.4	0.18	6.8	gm/hp-hr
Waterline Trencher	71	38%	27	0.82	9.14	1.4	0.18	6.8	gm/hp-hr
Portal Hardrock Drill	209	75%	157	0.82	9.14	1.4	0.18	6.8	gm/hp-hr
Frontend Loader	175	54%	95	0.97	9.32	0.8	0.18	4.8	gm/hp-hr
Rubble Haul Truck	350	25%	88	0.6	8.69	0.8	0.18	2.8	gm/hp-hr
Portal Transit Mixer	NA	NA	NA	2.57	18.95	1.98	0.52	9.1	gm/VMT
Tunnel Borer Generator	2600	75%	1950	0.82	9.32	1.3	0.18	4.8	gm/hp-hr
Spoil Haul Truck	350	25%	88	0.6	8.69	0.8	0.18	2.8	gm/hp-hr
Spoil Grader	147	54%	79	0.75	8.69	1.5	0.18	3.8	gm/hp-hr
Tower Excavator	71	38%	27	0.82	9.14	1.4	0.18	6.8	gm/hp-hr
Road Scraper	290	60%	174	0.82	9.32	1.3	0.18	4.8	gm/hp-hr
Road Grader	147	54%	79	0.75	8.69	1.5	0.18	3.8	gm/hp-hr
Road Roller	99	59%	58	0.6	8.42	0.8	0.18	3.1	gm/hp-hr
Utility Vehicle	NA	NA	NA	2.57	18.95	1.98	0.52	9.1	gm/VMT
Crew Vehicles	NA	NA	NA	2.57	18.95	1.98	0.52	9.1	gm/VMT

Equipment or Activity	Process Rate Max. Daily	Units		Emission Rate PM	NOx	VOC	SO2	CO	Units
Welldrilling Rig	8	hr		2.3	25.3	3.9	0.5	18.8	lb/day
Waterline Trencher	8	hr		0.4	4.3	0.7	0.1	3.2	lb/day
Portal Hardrock Drill	8	hr		2.3	25.3	3.9	0.5	18.8	lb/day
Frontend Loader	8	hr		1.6	15.5	1.3	0.3	8.0	lb/day
Rubble Haul Truck	8	hr		0.9	13.4	1.2	0.3	4.3	lb/day
Portal Transit Mixer	60.6	VMT		0.3	2.5	0.3	0.1	1.2	lb/day
Tunnel Borer Generator	24	hr		84.6	961.6	134.1	18.6	495.2	lb/day
Spoil Haul Truck	48	hr		5.6	80.5	7.4	1.7	25.9	lb/day
Spoil Grader	8	hr		1.1	12.2	2.1	0.3	5.3	lb/day
Tower Excavator	8	hr		0.4	4.3	0.7	0.1	3.2	lb/day
Road Scraper	8	hr		2.5	28.6	4.0	0.6	14.7	lb/day
Road Grader	8	hr		1.1	12.2	2.1	0.3	5.3	lb/day
Road Roller	8	hr		0.6	8.7	0.8	0.2	3.2	lb/day
Utility Vehicle	40	VMT		0.2	1.7	0.2	0.0	0.8	lb/day
Crew Vehicles	250	VMT		1.4	10.4	1.1	0.3	5.0	lb/day
			Subtotal	105.2	1206.5	163.7	23.6	613.2	lb/day

Equipment or Activity	Process Rate Annual	Units		Emission Rate PM	NOx	VOC	SO2	CO	Units
Welldrilling Rig	48	hr		13.6	151.6	23.2	3.0	112.8	lb/yr
Waterline Trencher	2080	hr		101.4	1130.8	173.2	22.3	841.3	lb/yr
Portal Hardrock Drill	32	hr		9.1	101.1	15.5	2.0	75.2	lb/yr
Frontend Loader	80	hr		16.2	155.3	13.3	3.0	80.0	lb/yr
Rubble Haul Truck	80	hr		9.3	134.1	12.3	2.8	43.2	lb/yr
Portal Transit Mixer	606.1	VMT		3.4	25.3	2.6	0.7	12.2	lb/yr
Tunnel Borer Generator	5580	hr		19670.2	223569.0	31184.5	4317.9	115142.9	lb/yr
Spoil Haul Truck	11160	hr		1291.7	18707.6	1722.2	387.5	6027.8	lb/yr
Spoil Grader	2080	hr		273.0	3163.2	546.0	65.5	1383.2	lb/yr
Tower Excavator	2080	hr		101.4	1130.8	173.2	22.3	841.3	lb/yr
Road Scraper	238.3	hr		75.0	852.0	118.8	16.5	438.8	lb/yr
Road Grader	476.6	hr		62.6	724.9	125.1	15.0	317.0	lb/yr
Road Roller	238.3	hr		18.4	258.4	24.6	5.5	95.1	lb/yr
Utility Vehicle	10400	VMT		58.9	434.5	45.4	11.9	208.6	lb/yr
Employee Vehicles	65000	VMT		368.3	2715.5	283.7	74.5	1304.0	lb/yr
			Subtotal	22072.5	253254.1	34463.8	4950.3	126923.3	lb/yr

EMISSION ANALYSIS

12/06/95

Firm: MRC
Project: Eagle Crest Energy Company

Phase: Construction
Alternative: Mitigated

SUMMARY: Daily Emissions

Equipment or Activity	Fugitive PM10	Exhaust PM10	Total PM10	NOx	VOC	SO2	CO	Units
Well Drilling	0.1		0.1					lb/day
Welldrilling Rig		2.3	2.3	4.5	6.8	11.3	18.1	lb/day
Waterline Trenching	3.7		3.7					lb/day
Waterline Trencher		0.4	0.4	0.8	1.2	2.0	3.1	lb/day
Tunnel Portal Construction	1.5		1.5					lb/day
Portal Hardrock Drill		2.3	2.3	4.5	6.8	11.3	18.1	lb/day
Frontend Loader		1.6	1.6	3.2	4.9	8.1	12.9	lb/day
Rubble Haul Truck		0.9	0.9	1.9	2.8	4.6	7.4	lb/day
Portal Transit Mixer		0.3	0.3	0.7	1.0	1.7	2.7	lb/day
Tunnel Drilling	0.0		0.0					lb/day
Tunnel Borer Generator		84.6	84.6	169.2	253.8	423.0	676.8	lb/day
Tunnel Spoil Transfer	5.3		5.3					lb/day
Spoil Haul Truck		5.6	5.6	11.1	16.7	27.8	44.4	lb/day
Tunnel Spoil Placement	6.8		6.8					lb/day
Spoil Grader		1.1	1.1	2.1	3.2	5.3	8.4	lb/day
Transmission Tower Erection	3.7		3.7					lb/day
Tower Excavator		0.4	0.4	0.8	1.2	2.0	3.1	lb/day
Access Road Construction	1596.7		1596.7					lb/day
Road Scraper		2.5	2.5	5.0	7.5	12.6	20.1	lb/day
Road Grader		1.1	1.1	2.1	3.2	5.3	8.4	lb/day
Road Roller		0.6	0.6	1.2	1.9	3.1	4.9	lb/day
Haul Road Use	81.1		81.1					lb/day
Utility Vehicle		0.2	0.2	0.5	0.7	1.1	1.8	lb/day
Crew Vehicles		1.4	1.4	2.8	4.2	7.1	11.3	lb/day
TOTAL			1804.1	210.5	315.7	526.2	841.9	lb/day

Annual Emissions

Equipment or Activity	Fugitive PM10	Exhaust PM10	Total PM10	NOx	VOC	SO2	CO	Units
Well Drilling	0.8		0.8					lb/yr
Welldrilling Rig		13.6	13.6	151.6	23.2	3.0	112.8	lb/yr
Waterline Trenching	950.0		950.0					lb/yr
Waterline Trencher		101.4	101.4	1130.8	173.2	22.3	841.3	lb/yr
Tunnel Portal Construction	29.3		29.3					lb/yr
Portal Hardrock Drill		9.1	9.1	101.1	15.5	2.0	75.2	lb/yr
Frontend Loader		16.2	16.2	155.3	13.3	3.0	80.0	lb/yr
Rubble Haul Truck		9.3	9.3	134.1	12.3	2.8	43.2	lb/yr
Portal Transit Mixer		3.4	3.4	25.3	2.6	0.7	12.2	lb/yr
Tunnel Drilling	0.0		0.0					lb/yr
Tunnel Borer Generator		19670.2	19670.2	223569.0	31184.5	4317.9	115142.9	lb/yr
Tunnel Spoil Transfer	1381.0		1381.0					lb/yr
Spoil Haul Truck		1291.7	1291.7	18707.6	1722.2	387.5	6027.8	lb/yr
Tunnel Spoil Placement	1779.9		1779.9					lb/yr
Spoil Grader		273.0	273.0	3163.2	546.0	65.5	1383.2	lb/yr
Transmission Tower Erection	950.0		950.0					lb/yr
Tower Excavator		101.4	101.4	1130.8	173.2	22.3	841.3	lb/yr
Access Road Construction	95131.0		95131.0					lb/yr
Road Scraper		75.0	75.0	852.0	118.8	16.5	438.8	lb/yr
Road Grader		62.6	62.6	724.9	125.1	15.0	317.0	lb/yr
Road Roller		18.4	18.4	258.4	24.6	5.5	95.1	lb/yr
Haul Road Use	12422.2		12422.2					lb/yr
Utility Vehicle		58.9	58.9	434.5	45.4	11.9	208.6	lb/yr
Crew Vehicles		368.3	368.3	2715.5	283.7	74.5	1304.0	lb/yr
TOTAL			134716.9	253254.1	34463.8	4950.3	126923.3	lb/yr
			67.4	126.6	17.2	2.5	63.5	ton/yr

EMISSION ANALYSIS 01/31/96

Firm: MRC Phase: **Operation**
Project: Eagle Crest Energy Company Alternative: **Mitigated**

Equipment or Activity	Process Rate Max. Daily	Annual	Units
Energy Supply to Pump	20520	4814871	MWH

	PM	NOx	ROG	SO2	CO	Units
Emission Factor	0.05	2.93	0.62	0.006	0.49	lb/MW-hr
Emission Rate	1026	60,124	12,722	123	10,055	lb/day
	240744	14,107,573	2,985,220	28,889	2,359,287	lb/yr

Assumption
- 1140 MW - pump input (EMEC A/L, V.1, p. A-10)
- 81 hr/wk - pumping schedule (EMEC A/L, V.1, p. A-1)
- 18 hr/day - max. pumping schedule (EMEC A/L, V.1, p. A-10)
- 5.0 lb PM10/MMft3 (AP-42, Table 1.4-1)
- 0.6 lb SO2/MMft3 (AP-42, Table 1.4-2)
- (Emission factors for NOx, ROG, and CO from backup to "Electric Vehicles and Powerplant Emissions", Angela Tanghetti, CEC, 6/95)
- 1000 BTU/ft3 - heat content of natural gas (assumed)
- 10,000,000 BTU/MW-hr (assumed)
- 92% transmission efficiency (assumed)

Calculated Values:
- 4224 hr/yr - pumping schedule
- 20520 MW-hr/day - pump energy consumption
- 4814871 MW-hr/yr - pump energy consumption

Equipment or Activity	Process Rate Max. Daily	Annual	Units	Emission Factor	Units	Control Efficiency	Emission Rate Max. Daily	Annual	Units
Access Road Use	35.0	9,100	VMT	NA	lb/VMT	95%	1.4	342.8	lb PM10

Assumptions
- 6.0% silt content (Air Quality Impacts of Eagle Mountain Project, SR, 8/90, Table 27)
- 20 day/yr precipitation >0.01 in. (AP-42, Fig. 13.2.2-1)

Activity	Speed (mph)	Weight (tons)	Wheels (#)	Emission Factor Max. Daily (lb/VMT)	Avg. Annual (lb/VMT)	Trip Length (mi)	Trip Frequency (trips/day)	(trips/yr)
Crew Transport	30	1	4	0.49	0.46	5.0	5	1300
Equipment Servicing	30	4	6	1.57	1.49	5.0	2	520

Activity	(VMT/day)	(VMT/yr)	Emission Rate (lb/day)	(lb/yr)	Number of Trucks
Crew Transport	25.0	6500.0	12.2	2989.8	2
Equipment Servicing	10.0	2600.0	15.7	3865.4	1

95% control efficiency from MgCl + watering (Fugitive Dust Controlfor Haul Roads, BuMn, 1987, p. 11)

Firm: MRC
Project: Eagle Crest Energy Company
Phase: Operation
Alternative: Mitigated

OTHER POLLUTANTS

Equipment or Activity	Power Rating (hp)	Load Factor (%)	Power Demand (hp)	Emission Factor PM	NOx	VOC	SO2	CO	Units
Utility Vehicle	NA	NA	NA	2.57	18.95	1.98	0.52	9.1	gm/VMT
Crew Vehicles	NA	NA	NA	2.57	18.95	1.98	0.52	9.1	gm/VMT

Equipment or Activity	Process Rate Max. Daily	Units		Emission Rate PM	NOx	VOC	SO2	CO	Units
Utility Vehicle	10	VMT		0.2	1.7	0.2	0.0	0.8	lb/day
Crew Vehicles	25	VMT		1.4	10.4	1.1	0.3	5.0	lb/day
			Subtotal	1.6	12.1	1.3	0.3	5.8	lb/day

Equipment or Activity	Process Rate Annual	Units		Emission Rate PM	NOx	VOC	SO2	CO	Units
Utility Vehicle	2600	VMT		58.9	434.5	45.4	11.9	208.6	lb/yr
Crew Vehicles	6500	VMT		368.3	2715.5	283.7	74.5	1304.0	lb/yr
			Subtotal	427.2	3150.0	329.1	86.4	1512.7	lb/yr

Firm: MRC Phase: **Operation**
Project: Eagle Crest Energy Company Alternative: **Mitigated**

SUMMARY **Daily Emissions**

Equipment or Activity	Fugitive PM10	Exhaust PM10	Total PM10	NOx	VOC	SO2	CO	Units
Energy Supply to Pump	NA	NA	1026.0	60123.6	12722.4	123.1	10054.8	lb/day
Access Road Use	1.4		1.4					lb/day
Utility Vehicle		0.2	0.2	0.5	0.7	1.1	1.8	lb/day
Crew Vehicles		1.4	1.4	2.8	4.2	7.1	11.3	lb/day
TOTAL ONSITE EMISSIONS			3.0	3.3	4.9	8.2	13.1	lb/day
TOTAL OFFSITE EMISSIONS			1026.0	60123.6	12722.4	123.1	10054.8	lb/day
GRAND TOTAL			1029.0	60126.9	12727.3	131.3	10067.9	**lb/day**
			0.515	30.1	6.4	0.1	5.0	**ton/day**

Annual Emissions

Equipment or Activity	Fugitive PM10	Exhaust PM10	Total PM10	NOx	VOC	SO2	CO	Units
Energy Supply to Pump	NA	NA	120.4	7053.8	1492.6	14.4	1179.6	ton/yr
Access Road Use	0.2		0.2					ton/yr
Utility Vehicle		0.0	0.0	0.2	0.0	0.0	0.1	ton/yr
Crew Vehicles		0.2	0.2	1.4	0.1	0.0	0.7	ton/yr
TOTAL ONSITE EMISSIONS			0.4	1.6	0.2	0.0	0.8	ton/yr
TOTAL OFFSITE EMISSIONS			120.4	7053.8	1492.6	14.4	1179.6	ton/yr
GRAND TOTAL			120.8	7055.4	1492.8	14.5	1180.4	**ton/yr**

Section A-14
Eagle Mountain Landfill And Recycling Center
Emission Calculations
Energy Recovery Systems

Table A-14-1

Landfill Gas Treatment and Compression Facility - Combustion Emissions

Equipment	Fuel	Equip. Rating	Units	Emission Factors(1) NOx	CO	PM10	NMHC	SOx	Units	Daily Emissions NOx (lbs/day)	CO (lbs/day)	PM10 (lbs/day)	NMHC (lbs/day)	SOx (lbs/day)	Annual Emissions(2) NOx (tons/yr)	CO (tons/yr)	PM10 (tons/yr)	NMHC (tons/yr)	SOx (tons/yr)
Flare (fuel combustion)	Nat. Gas	50	MMBtu/hr	0.070	0.002	0.012	0.002	6.0E-04	lbs/MMBtu	84.00	2.52	14.40	2.30	0.72	15.33	0.46	2.63	0.42	0.13
Flare (sulfur combustion)	Landfill Gas	66	MMscf/day	N/A	N/A	N/A	N/A	6.5E-06	lbs/scf					428.30					78.16
									Total =	84.00	2.52	14.40	2.30	429.02	15.33	0.46	2.63	0.42	78.30

Footnotes:
(1) Natural gas combustion emission factors from AP-42, Tables 1.4-1, 1.4-2, 1.4-3, 7/93, for small commercial boilers. Emission factors converted from lbs/MMscf to lbs/MMBtu based on natural gas high heating value of 1000 Btu/scf.
Emission factors include 30% NOx control with use of SCR or ammonia injection system, 90% control for CO and 50% control for NMHC with use oxidation catalyst.
Sulfur combustion emissions factors based on reducing landfill gas sulfur content from 40 ppmv to 1.5 ppmv for pipeline quality gas.
(2) Annual emissions based on 365 days per year of operation.

Table A-14-2

Landfill Gas Treatment and Compression Facility - Tank Emissions

Tank	Tank Size (gal)	Daily(1) Throughput (mgal/day)	Annual(2) Throughput (mgal/yr)	Emiss. Control Equip.	NMHC Emission Factors(3) Working Losses (lbs/mgal)	Breathing Losses (lbs/mgal)	NMHC Emissions Working Losses (lbs/day)	Breathing Losses (lbs/day)	NMHC Emissions Working Losses (lbs/yr)	Breathing Losses (lbs/yr)		Total NMHC Emissions (lbs/day)	Total NMHC Emissions (tons/yr)
Condensate Storage	8000	2	730	P-Relief Valves	0.024	0.004	0.05	0.01	17.70	2.74		0.06	0.01
											Total =	0.06	0.01

Footnotes:
(1) Daily throughput is based on tank refill every four days.
(2) Annual throughput is based on 365 days per year of operation.
(3) Emissions factors from EPA Tanks model assuming the storage of Diesel fuel.

Table A-14-3

Landfill Gas Treatment and Compression Facility - Emission Summary

Source Type	NOx Emiss. (lbs/day)	CO Emiss. (lbs/day)	PM10 Emiss. (lbs/day)	VOC Emiss. (lbs/day)	SOx Emiss. (lbs/day)	NOx Emiss. (tons/yr)	CO Emiss. (tons/yr)	PM10 Emiss. (tons/yr)	VOC Emiss. (tons/yr)	SOx Emiss. (tons/yr)
Combustion Emissions	84.00	2.52	14.40	2.30	429.02	15.33	0.46	2.63	0.42	78.30
Storage Tank	N/A	N/A	N/A	0.06	N/A	N/A	N/A	N/A	0.01	N/A
Valves and Flanges	N/A	N/A	N/A	4.43	N/A	N/A	N/A	N/A	0.81	N/A
Total	84.00	2.52	14.40	6.78	429.02	15.33	0.46	2.63	1.24	78.30

Table A-14-4

Gas Turbine Power Plant

Equipment	Fuel	Equip. Rating	Units	Emission Factors(1) NOx	CO	PM10	NMHC	SOx	Units	Daily Emissions NOx (lbs/day)	CO (lbs/day)	PM10 (lbs/day)	NMHC (lbs/day)	SOx (lbs/day)	Annual Emissions(2) NOx (tons/yr)	CO (tons/yr)	PM10 (tons/yr)	NMHC (tons/yr)	SOx (tons/yr)
Gas Turbine	Landfill Gas	1394	MMBtu/hr	0.018	0.005	0.006	0.006	0.014	lbs/MMBtu	585.40	170.60	199.03	196.02	468.32	106.83	31.13	36.32	35.77	85.47

Footnotes:
(1) Emission factors for NOx, CO, PM10, and NMHC from vendor data for a combined fuel (natural gas/digester gas) gas turbine power plant located in Northern California equipped with SCR and oxidation catalyst.
SOx emission factor based on landfill gas sulfur content of 40 ppmv per Rule 431.1.
(2) Annual emissions based on 365 days per year of operation.

Table A-14-5

Landfill Gas Treatment and Compression Facility - Valve and Flange Emissions

System	Num. of In-Line Valves	Num. of Open Ended Valves	Num. of P-Relief Valves	Num. of Flanges	THC Emiss. Factor In-Line Valve(1) (lbs/hr-valve)	THC Emiss. Factor O-Ended Valve(1) (lbs/hr-valve)	THC Emiss. Factor P-Relief Valve(1) (lbs/hr-valve)	THC Emiss. Factor Flanges(1) (lbs/hr-flange)	NMHC Cont. of Nat. Gas(2) (% weight)	NMHC Emiss. Factor In-Line Valves (lbs/hr-valve)	NMHC Emiss. Factor O-Ended Valve (lbs/hr-valve)	NMHC Emiss. Factor P-Relief Valve (lbs/hr-valve)	NMHC Emiss. Factor Flanges (lbs/hr-flange)	NMHC Emiss. In-Line Valves (lbs/hr)	NMHC Emiss. O-Ended Valve (lbs/hr)	NMHC Emiss. P-Relief Valve (lbs/hr)	NMHC Emiss. Flanges (lbs/hr)	Total NMHC Emiss. (lbs/hr)	Total(3) NMHC Emiss. (lbs/day)	Total(4) NMHC Emiss. (tons/yr)
Comp. Yard (control racks)	32			46	0.059	0.005	0.36	0.00058	1.3%	0.0008	0.0001	0.0048	0.00001	0.0253	0.0000	0.0000	0.0003	0.0257	0.62	0.1125
Comp. Yard (gas scrubber)		1	1	4	0.059	0.005	0.36	0.00058	1.3%	0.0008	0.0001	0.0048	0.00001	0.0000	0.0001	0.0048	0.0000	0.0049	0.12	0.0216
Comp. Yard (gas cooler)	3	1		17	0.059	0.005	0.36	0.00058	1.3%	0.0008	0.0001	0.0048	0.00001	0.0024	0.0001	0.0000	0.0001	0.0026	0.06	0.0113
Comp. Yard (misc.)	38	12		72	0.059	0.005	0.36	0.00058	1.3%	0.0008	0.0001	0.0048	0.00001	0.0301	0.0008	0.0000	0.0005	0.0314	0.75	0.1377
Gas Processing (gas cooling)	23	3	3	29	0.059	0.005	0.36	0.00058	1.3%	0.0008	0.0001	0.0048	0.00001	0.0182	0.0002	0.0145	0.0002	0.0331	0.79	0.1451
Gas Processing (scrubber)	3		1	11	0.059	0.005	0.36	0.00058	1.3%	0.0008	0.0001	0.0048	0.00001	0.0024	0.0000	0.0048	0.0001	0.0073	0.17	0.0318
Gas Processing (dehydrators)	30	3		97	0.059	0.005	0.36	0.00058	1.3%	0.0008	0.0001	0.0048	0.00001	0.0308	0.0002	0.0000	0.0007	0.0318	0.76	0.1393
Gas Processing (regenerators)	42	18		32	0.059	0.005	0.36	0.00058	1.3%	0.0008	0.0001	0.0048	0.00001	0.0333	0.0012	0.0000	0.0002	0.0347	0.83	0.1520
Gas Processing (flare)	16			28	0.059	0.005	0.36	0.00058	1.3%	0.0008	0.0001	0.0048	0.00001	0.0127	0.0000	0.0000	0.0002	0.0129	0.31	0.0563
																	Total =	0.18	4.43	0.81

Footnotes:
(1) Emission factors from AP-42, Table 9.1-2, October 1990 for uncontrolled pipeline components used for gas streams.
(2) Based on 1/26/96 analysis of PG&E Los Medanos natural gas.
(3) Based on 24 hrs/day of operation.
(4) Based on 365 days/yr of operation.

Section A-15
Eagle Mountain Landfill And Recycling Center
Rail Emission Calculations
for SDAB and SCCAB

Impacts in San Diego and South Central Coast Air Basins

Assumptions:

The rail distance in the San Diego Air Basin is the rail distance of 62 miles between San Diego and San Celemente. The rail distance in the South Central Coast Air Basin is the 65 mile distance from Santa Barbara to Chatsworth. (These distances were taken from the Booz-Allen Report on rail emissions.)

Southern Pacific did an analysis of rail fuel use fora proposed project to dispose of municipal solid waste (MSW) from Napa county. That study determined that the weight of the MSW was 63% of the trailing weight of the train. In that analysis two types of route--level and mountainous--were examined. The level route data were used for San Diego and South Central Coast rail corridors. For this simulation the train used 0.994 gallons of fuel per thousand trailing ton miles. This figure is used to compute the fuel use for the routes in San Diego and the South Central Coast.

Although these trains will not be counted in the South Coast fleet average requirement it is unlikely that the railroads will change out the locomotives in at the Basin boundaries. Consequently the locomotives are assumed to have a 67% reduction in NOx for the mitigated case in accordance with the locomotive measure in the 1994 California SIP.

Train Fuel Use Calculations

MSW Weight	2560	tons
Total Trailing Weight	4060	tons
Fraction of Weight due to MSW	63.05%	
Flat Terrain Fuel Use	148	gallons
Flat Terrain Trailing Tons	4426	tons
Flat Terrain Mileage	33.63	miles
Flat Terrain Fuel/Trailing Ton Mile	0.000994	gallons/TTM

San Diego Air Basin Data

Route Distance	62	miles
MSW Hauled	1000	tons/day
Rail Trailing Tons Loaded	1,585.9	trailing tons/day
Rail Trailing Tons Empty	585.9	trailing tons/day
Round Trip Trailing Tons	2,171.9	trailing tons/day
Round Trip Fuel Use	133.89	gallons/day
Round Trip Fuel Use	48,870	gallons/year

South Central Coast Air Basin Data

Route Distance	65	miles
MSW Hauled	600	tons/day
Rail Trailing Tons Loaded	951.6	trailing tons/day
Rail Trailing Tons Empty	351.6	trailing tons/day
Round Trip Trailing Tons	1,303.1	trailing tons/day
Round Trip Fuel Use	84.22	gallons/day
Round Trip Fuel Use	30,741	gallons/year

Emission Impacts in Project Alternative without Mitigation

Species	NOx	CO	PM	VOC	SO2
Emission Factor lb/thousand gallons	502.5	71.5	11.3	22.5	38.0
San Diego Daily Impact (lb/day)	67	10	2	3	5
San Diego Annaul Impact (tons/yr)	12	2	0	1	1
South Central Coast Daily Impact (lb/day)	42	6	1	2	3
South Central Coast Annual Impact (tons/yr)	8	1	0	0	1

Emission Impacts in Reduced Volume Alternative without Mitigation

Species	NOx	CO	PM	VOC	SO2
San Diego Daily Impact (lb/day)	52	7	1	2	4
San Diego Annaul Impact (tons/yr)	10	1	0	0	1
South Central Coast Daily Impact (lb/day)	33	5	1	1	2
South Central Coast Annual Impact (tons/yr)	6	1	0	0	0

Emission Impacts in Project Alternative with Mitigation

Species	NOx	CO	PM	VOC	SO2
Emission Factor lb/thousand gallons	165.8	71.5	11.3	22.5	38.0
San Diego Daily Impact (lb/day)	22	10	2	3	5
San Diego Annaul Impact (tons/yr)	4	2	0	1	1
South Central Coast Daily Impact (lb/day)	14	6	1	2	3
South Central Coast Annual Impact (tons/yr)	3	1	0	0	1

Emission Impacts in Reduced Volume Alternative with Mitigation

Species	NOx	CO	PM	VOC	SO2
San Diego Daily Impact (lb/day)	17	7	1	2	4
San Diego Annaul Impact (tons/yr)	3	1	0	0	1
South Central Coast Daily Impact (lb/day)	11	5	1	1	2
South Central Coast Annual Impact (tons/yr)	2	1	0	0	0

Section A-16
Emission Calculations for
La Paz Landfill

La Paz Landfill Rail Calculations

Assumptions:

The rail emissions to the La Paz County, Arizona, landfill will the same (per ton of waste) as those to the Rail Cycle Bolo Station landfill plus the additional emissions for the remaining 111 miles to the La Paz landfill. (Distance determined from map of rail route.) For this cumulative effects analysis a total of 12,000 tons of trash per day was assumed to come from Los Angeles.

Southern Pacific did an analysis of rail fuel use for a proposed project to dispose of municipal solid waste (MSW) from Napa county. That study determined that the weight of the MSW was 63% of the trailing weight of the train. In that analysis two types of route–level and mountainous–were examined. The level route data were used for the route between Amboy, California (Bolo station) and the La Paz landfill. (Topographic maps show that the terrain in this area is essentially "level.") For this simulation the train used 0.994 gallons of fuel per thousand trailing ton miles. This figure is used to compute the fuel use for the additional train distance between Amboy and La Paz.

The mitigated results were calculated here by assuming the same percent reduction between the unmitigated case and the mitigated case as was assumed in the Rail Cycle/Bolo Station EIR.

Train Fuel Use Calculations from SP Simulation

MSW Weight	2560	tons
Total Trailing Weight	4060	tons
Fraction of Weight due to MSW	63.05%	
Flat Terrain Fuel Use	148	gallons
Flat Terrain Trailing Tons	4426	tons
Flat Terrain Mileage	33.63	miles
Flat Terrain Fuel/Trailing Ton Mile	0.000994	gallons/TTM

Train Fuel Use Calculations for Additional Distance to La Paz

MSW weight (assumed)	12,000	tons/day
Required trailing weight of train	19,031	tons/day
Additional Distance from Amboy to La Paz	111	miles
Trailing ton miles for added distance	2,112,469	TTM/day
Fuel use for additional distance	2,100	gallons/day

Emission Factors are in pounds per thousand gallons

	NOx Emission Factor	CO Emission Factor	PM Emission Factor	HC Emission Factor	SO2 Emission Factor
	502.5	71.5	11.3	22.5	38.0
Unmitigated Case					
Additional Emissions (lb/day)	1,055.5	150.2	23.7	47.3	79.8
Additional Emissions (tons/year)	192.63	27.41	4.33	8.63	14.57
Bolo Cycle Emissions (lb/day for 21,000 tpd MSW)	12,158.9	9,167.1	2,032.9	2,186.3	767.1
Bolo Cycle Emissions (tons/year for 21,000 tpd MSW)	2219	1673	371	399	140
Total Emissions for La Paz (lb/day)	8,003	5,389	1,185	1,297	518
Total Emissions for La Paz (tons/year)	1,461	983	216	237	95
Mitigated Case					
Additional Emissions (lb/day)	584.8	14.6	1.7	5.7	50.1
Additional Emissions (tons/year)	106.73	2.67	0.31	1.04	9.14
Bolo Cycle Emissions (lb/day for 21,000 tpd MSW)	7,881.6	1,045.8	169.6	307.0	562.5
Bolo Cycle Emissions (tons/year for 21,000 tpd MSW)	1229.5	163.1	26.5	47.9	87.8
Rail Emissions for La Paz (lb/day)	**5,089**	**612**	**99**	**181**	**371**
Rail Emissions for La Paz (tons/year)	**929**	**112**	**18**	**33**	**68**

Section A-17
Emission Calculations for
Joshua Tree National Park

Table A-17-1

Emission Impact of Joshua Tree National Park		
Location of Emissions	Inside Park	Outside Park
Visitors Added per Year	2,100,000	
Average Visitors per Vehicle	2.5	
Vehicles Added per Year	840,000	
Paved Road Distance (miles)	50	100
Unpaved Road Distance (miles)	2	0
Total Distance (miles)	52	100
NOx Running Emission Factor (g/mi)*	0.26	
CO Running Emission Factor (g/mi)*	2.23	
Vehicle PM_{10} Emission Factor (g/mi)*	0.105	
Paved Road PM_{10} Emission Factor (lb/mi)**	0.013	
Unpaved Road PM_{10} Emission Factor (lb/mi)**	2.45	
ROG Running Emission Factor (g/mi)*	0.12	
SO_2 Emission Factor (g/mi)*	0.05	
NOx Running Emissions (tons/year)	12.52	24.07
CO Running Emissions (tons/year)	107.37	206.49
Vehicle PM_{10} Emissions (tons/year)	5.06	9.72
Paved Road PM_{10} Emissions (tons/year)	273.00	546.00
Unpaved Road PM_{10} Emissions (tons/year)	2,058.00	0.00
Total PM_{10} Emissions (tons/year)	2,336.06	555.72
ROG Running Emissions (tons/year)	5.78	11.11
SO_2 Emissions (tons/year)	2.41	4.63
NOx Start Emission Factor (g/trip)*	1.20	
CO Start Emission Factor (g/trip)*	47.75	
ROG Start Plus Hot Soak (g/trip)*	1.57	
ROG Diurnal (g/vehicle-day)*	0.54	
Start NOx (tons/year)	1.11	1.11
Start CO (tons/year)	44.21	44.21
ROG Start Plus Hot Soak (tons/year)	1.45	1.45
ROG Diurnal (tons/year)	0.50	(0.50)
Total NOx (tons/year)	14	25
Total CO (tons/year)	152	251
Total PM_{10} (tons/year)	2,336	556
Total ROG (tons/year)	2	12
Total SO_2 (tons/year)	2	5

Notes: *Vehicle emission factors from EMFAC7EP for 2010
**Road dust emission factors from AP-42

Attachment B

Initial Construction of Proposed Project

Attachment B
Initial Construction of Proposed Project

B.1. Construction Phases

Initial construction of the Proposed Project is divided into five main construction projects: (1) improvement/extension of the existing Eagle Mountain Road; (2) construction of Phase I intermodal rail/truck marshalling yard including refurbishing existing warehouse and shop facilities; (3) reconstruction of the existing Eagle Mountain rail line; (4) preparation of the first phase of the landfill. Improvement/extension of the existing Eagle Mountain Road will be the initial construction phase of the Proposed Project; and (5) improvement to Eagle Mountain Townsite. After work begins on the Eagle Mountain Road improvements, the construction of the Phase I intermodal/truck marshaling yard, reconstruction of the existing Eagle Mountain rail line, landfill construction, and Townsite improvements will begin. The following paragraphs discuss each construction project in more detail and describe the heavy equipment associated with construction of the Proposed Project.

B.1.1 Eagle Mountain Road

The existing Eagle Mountain Road will be improved during the construction of the Eagle Mountain facility. Eagle Mountain Road runs north from its intersection with Interstate Highway 10 (approximately 4 miles west of Desert Center) to the Colorado River Aqueduct Eagle Mountain Pumping Plant. This road will be widened and improved to meet the design standards of the County of Riverside. This improvement to the Eagle Mountain Road will consist of widening the road, adding new aggregate base, new pavement, and additional drainage. In addition to improving the existing road, this construction phase will include an extension to the Eagle Mountain Road. The Eagle Mountain Road extension will be used to access the landfill from the northern terminus of the existing Eagle Mountain Road. The extension will begin from just south of the Metropolitan Water District Pumping Station and follow the alignment of the old Kaiser Truck Road. It will then be routed in a northerly direction into the container handling facility at the eastern edge of the project site. Road construction will initially consist of clearing the roadway. Next, the rough earth work will take place to bring the roadway up to final grade. Finally, sub-base and aggregate base will be laid down before the asphalt concrete is applied. It will be necessary to construct stream crossings and add drainage systems to portions of the roadway to ensure year round operation. Diesel scrapers, dump trucks, bulldozers, graders, frontend loaders, backhoes, paving machines, and compactors will be used during road construction (operating approximately 8 hours per day).

B.1.2 Phase I Intermodal/Truck Marshaling Yard

The initial development of the Proposed Project will also include the construction of the Phase I intermodal/truck marshaling yard. The intermodal/truck marshaling yard will be used to receive and store containers from trucks and trains. Construction of the Phase I intermodal/truck marshaling yard will include the following: (1) renovation of existing buildings for use as facilities to repair and maintain landfill equipment and rolling stock; (2) construction of a wash facility used to keep haul vehicles, heavy equipment, and refuse containers free of debris; (3) construction of office facilities; (4) construction of a parallel rail spur at the existing terminus of the Eagle Mountain rail line; (5) construction of access roads and vehicle parking; and (6) construction of drainage systems. Construction of plant structures will consist of clearing facility building sites, adding aggregate to bring facility building sites to grade, and adding plumbing and electrical systems. Diesel bulldozers, scrapers, frontend loaders, compactors, graders, backhoes, paving machines, a rail laying machine, and dump trucks will be used during the construction of the Phase I intermodal/truck marshaling yard (operating approximately 8 hours per day).

B.1.3 Eagle Mountain Rail Line

The initial Construction of the Proposed Project will also include reconstruction of the existing Eagle Mountain industrial rail line. The entire length of the 52 mile long Eagle Mountain industrial rail line will be inspected. Only portions of the rail line that need repair will be worked on. The reconstruction of these portions of the rail line will consist of replacing rails, ties, and ballast. In addition, reconstruction of the rail line will include repair and improvement of existing drainage facilities. Diesel scrapers, bulldozers, graders, dump trucks, frontend loaders, a rail laying machine, backhoes, and compactors will be used to reconstruct the Eagle Mountain rail line (operating approximately 8 hours per day).

B.1.4 Phase I of Landfill

Finally, construction of the Proposed Project will consist of preparation of the landfill to accept refuse. Landfill preparation activities will include leveling and grading certain areas, scaling of loose rock, construction of protective structures to prevent damage or injury from falling rock, and construction of the landfill liner system. Permanent drainage works will be installed consisting of the construction of dikes, drainage channels, and sedimentation basins around certain areas of the landfill. Preliminary development of landfill gas and leachate collection and treatment facilities will involve the construction of leveled areas to permit the installation of tanks and other processing equipment. As with other areas of construction within the project, Diesel-powered bulldozers, graders, and trucks will be used. It should be noted that the construction activities associated with the preparation of the landfill will continue during the operation of the project. Consequently, the emission estimates contained in Part 5 of the air quality impact report include the emissions for this phase of construction.

B.1.5 Townsite Improvements

The Eagle Mountain Townsite improvements will include the construction of 37 multiple and 283 single dwelling units. Construction of these dwellings will consist of clearing building sites, adding aggregate to bring sites to grade, and adding plumbing and electrical systems. Diesel bulldozers, frontend loaders, compactors, scrapers, graders, and backhoes will be used for this construction project.

B.1.6 Temporary Equipment

A portable asphalt plant and a portable concrete batch plant will be operated during the initial construction phase of the Proposed Project. The temporary plants will be located near one of the existing Eagle Mountain coarse tailing/overburden piles. The purpose of these plants is to supply asphalt and concrete for road and plant site building construction. Due to the remote location of the Eagle Mountain facility, it is necessary to use temporary onsite asphalt and concrete batch plants rather than haul these materials from existing asphalt and concrete batch plants located in Riverside County.

B.1.7 Construction Scheduling

The improvement/extension of the Eagle Mountain Road will be the first of the three construction phases. The improvements to the Eagle Mountain Road are scheduled to take approximately 20 weeks. Within a few weeks after construction begins on the Eagle Mountain Road, site preparation for the Phase I intermodal/truck marshaling yard, reconstruction of the existing industrial rail line, and landfill development will begin. Construction of the Phase I intermodal/truck marshaling yard is scheduled to take approximately 90 days to complete. The reconstruction of the industrial rail line and landfill development is scheduled to take approximately 120 days to complete. Improvements to the Townsite are expected to take approximately 20 weeks to complete. Therefore, the maximum emissions during construction of the Eagle Mountain facility will occur a few weeks after work begins on improving the Eagle Mountain Road when construction of the intermodal/truck marshaling yard, reconstruction of the industrial rail line, landfill development, Eagle Mountain Road construction, and improvements to the Townsite will occur simultaneously.

B.1.8 Emissions

Fugitive emissions from the initial construction of the Proposed Project result from: (1) dust entrained during excavation and grading at the construction sites; (2) dust entrained during travel on unpaved haul roads and across unpaved construction sites; (3) dust entrained during aggregate and soil loading and unloading operations; (4) dust entrained from raw material transfer at the portable asphalt and concrete batch plants; and (5) wind erosion of areas disturbed during construction activities. Heavy equipment exhaust emissions result from: (1) exhaust from the heavy equipment used for excavation and construction; (2) exhaust from the water trucks used to control construction dust emissions; (3) exhaust from Diesel generators located at the

temporary asphalt and concrete batch plants; and (4) exhaust from heaters located at the temporary asphalt plant.

B.2. Available Mitigation Measures

B.2.1 Mitigation of Heavy Equipment Emissions

Exhaust pollutant emissions from the Diesel heavy equipment used during project construction will contribute to the overall emissions during the construction phase of the Proposed Project. Measures which could be taken to mitigate these emissions include the following:

1. operational measures, such as limiting time spent with the engine idling by shutting down equipment when not in use;

2. regular preventive maintenance to prevent emission increases due to engine problems;

3. use of low sulfur and low aromatic fuel meeting California standards for motor vehicle Diesel fuel;

4. use of turbocharger and intercooled Diesel engines when available, with retarded injection timing;

5. use of low-emitting Diesel engines meeting federal/California emissions standards for highway trucks; and/or

6. electrification of temporary asphalt and concrete batch plants

Operational Measures to Reduce Emissions. Operational measures to conserve fuel and reduce emissions include minimizing engine idle time and using only the number of machines required for a given volume of material handled. Idle time will be minimized by instructing equipment operators to shut down their machines rather than letting them idle for more than fifteen minutes. Operations managers will be instructed to schedule machines and operators to match the anticipated material volume. This will help to reduce operating costs and wear and tear on equipment as well as emissions.

Preventive Maintenance. All construction equipment should be subject to regular preventive maintenance in order to detect and prevent mechanical problems which can lead to increased emissions. These mechanical problems include clogged air filters, worn or damaged turbochargers, and problems with the fuel injection system. Equipment operators and supervisors should be instructed to report any evidence of excessive smoke or other symptoms so that the equipment can be scheduled for maintenance in a timely fashion.

Low Sulfur/Low Aromatic Fuel. California Air Resources Board regulations limiting the sulfur and aromatic content of motor vehicle Diesel fuel took effect in 1993. Construction machinery is included in the California Air Resources Board's expanded definition of a "motor vehicle." Thus, this regulation requires all construction equipment to use low-sulfur/low aromatic fuel. Since construction equipment engines are technically similar to those used in trucks, the reduction in emissions will probably be of the same order as that projected for truck engines by the California Air Resources Board. The use of low-sulfur fuel will reduce SO_2 emissions by 90%, and will reduce PM_{10} emissions by roughly 0.07 g/BHP-hr, which is roughly 10-20% of anticipated PM_{10} emissions. Based on California Air Resources Board's projections for truck engines, the reduction in aromatic content should reduce NOx emissions by about 4%, and lead to a further 10-20% reduction in PM_{10} emissions.

Turbocharging/Intercooling/Retarded Injection Timing. NOx and particulate emissions from Diesel engines can be reduced through a combination of turbocharging, intercooling (to the lowest temperature practical), and retarded injection timing, especially at high loads. Turbocharger and intercooled engines should be chosen for all major Diesel equipment used in the construction of the project, unless (a) there are no suitable equipment models available with turbocharging and intercooling, either as standard equipment or as an available option; or (b) the manufacturer demonstrates that the engine achieves similar emissions performance by some other means. This latter exception would include on-highway certified engines, or engines meeting federal/California Air Resources Board emission standards for construction equipment.

Except in the case of engines which are already emission-controlled (in which case injection timing is normally retarded already), all Diesel engines in construction equipment should have their fuel injection timing adjusted to a retarded setting. The degree of timing retardation used should be chosen to reduce NOx as much as possible, while minimizing the increase in smoke, PM_{10}, and VOC emissions due to the retarded timing. The optimal degree of timing retardation will vary from one engine model to another, and should be selected in consultation with the engine manufacturer.

Use of On-Highway Engines. In addition to turbocharging, low-temperature intercooling, and retarded injection timing, Diesel engines certified to meet federal/California's 1994 emission standards for on-highway vehicles will exhibit a number of other emissions-related modifications and control technologies. These will generally include electronic control of fuel injection timing and quantity, increased fuel injection pressure, and optimization of piston and combustion chamber design to reduce emissions. These engines will be required to emit no more than 5.0 g/BHP-hr NOx and 0.10 g/BHP-hr of particulate matter. Achieving these targets will require extensive engine optimization, so that these on-highway certified engines will generally exhibit lower emissions overall than off-highway engines retrofitted with specific emissions controls. Engines meeting 1998 on-highway standards will achieve

even lower NOx emissions (i.e., 4.0 g/BHP-hr), probably through the use of still more advanced emission control technology.

It may be possible to use these engines (or similar engines utilizing nearly the same technology) in construction equipment, such as the bulldozers, compactors, loaders, scrapers, and off-highway trucks. This will not always be possible, however, due to the important differences in duty cycle, torque rise requirements, engine mounting, and cooling requirements between construction machinery and on-highway trucks. The feasibility of using an on-highway certified engine should be reviewed for each piece of construction equipment, and such engines should be used unless (1) there is no suitable engine available or (2) the mounting and installation requirements, or duty cycle limitations, make it infeasible to use any available engines in the specific equipment under consideration.

Electrification. Replacement of the Diesel engine electric generators used for the temporary asphalt plant and concrete batch plant with power supplied directly from the utility grid system would produce virtually a 100% reduction in exhaust emissions for this equipment.

B.2.2 Mitigation for Fugitive Dust Impacts

Fugitive dust emissions due to material handling and the passage of vehicles over paved and unpaved roads will contribute to the overall emissions during initial construction of the Proposed Project. Primary sources will include the movement of vehicles over paved and unpaved roads, the excavation of soil, the spreading and compaction of soil and aggregate, and wind erosion of disturbed areas.

Road Surfaces. Fugitive dust emissions from unpaved road surfaces should be mitigated by either water application or chemical dust palliative application. For unpaved roads and parking lots which are very temporary, frequent watering should be used to maintain surface moisture contents to levels sufficient to minimize dust emissions. Water application rates will depend on onsite traffic levels and peak evaporation rates.

Chemical dust suppressants applied to the surface of unpaved haul roads should be used to control fugitive dust emissions. The solution application rate will depend on the type of additive used (i.e., asphalt emulsion, petroleum resin, acrylic cement, etc.) and concentration of the solution. Research data should be used to select two to four commercial products for onsite testing during project startup. Demonstration sections of treated roadway should be visually inspected on a daily basis to determine the duration of dustless operation. The additive which is most cost-effective in maintaining negligible visible emissions should be chosen for ongoing project use. The results of the field study should also be used to determine the necessary chemical reapplication interval.

Fugitive dust emissions from paved road travel should be mitigated by vacuum sweeping and/or water flushing of road surface to remove buildup of loose material. The paved haul roads should be inspected daily to determine the frequency of surface cleaning necessary to minimize dust emissions. In addition, chemical stabilization of blow sand areas adjacent to paved haul roads should be performed to minimize fugitive dust emissions.

Soil Excavation. Fugitive dust emissions from the excavation of soil at the construction sites should be mitigated by prewatering. The moisture content which achieves nearly dustless conditions upon excavation and loadout of the soil should be used as a standard operating practice.

Temporary Concrete Batch Plant. Fugitive dust emissions from batch loading and material transport at the concrete batch plant should be mitigated with the installation and operation of spray nozzles or filters at all transfer points.

Temporary Asphalt Plant. Fugitive dust emissions from batch loading and material transport at the asphalt plant should be mitigated with the installation and operation of spray nozzles or filters at all transfer points.

Wind Erosion. Fugitive dust emissions from wind erosion of inactive areas disturbed from construction activities should be mitigated by compacting and treating with a chemical dust suppressant or protected with a fabric cover.

B.3. Mitigation Measures Recommended During Initial Construction of Project

Based on the discussion in the preceding section, the following mitigation measures are recommended during the initial construction of the Proposed Project.

Mitigation Measure MC-1: Construction Equipment Operating Procedures

Mine Reclamation Corporation and its contractors should ensure that equipment operators at the project construction site shut down their engines if the equipment will be idle for fifteen minutes or longer. The number of machines and operators to match the anticipated material volumes should be scheduled to avoid excessive queuing.

Mine Reclamation Corporation should ensure that Diesel-fueled equipment at the project construction site receive regular preventive maintenance, in accordance with the engine manufacturers' recommendations. This maintenance should include daily visual checks for excessive smoke by the operations or maintenance staff. Equipment which is observed to have excessive opacity in excess of 20% should be removed from service at the end of the next work shift, and adjusted and/or repaired before resuming operation at the construction site.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure MC-2: Diesel Fuel for Construction Equipment

All Diesel-fueled equipment at the project construction site should be fueled with Diesel fuel that meets the requirements of the California Air Resources Board for on-highway motor vehicles. The equipment to use this fuel includes the oil-fired heaters located at the temporary asphalt plant. Mine Reclamation Corporation should maintain a record of all Diesel fuel purchases that includes a statement by the supplier that the fuel complies with this requirement.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure MC-3: On-Highway Engines for Construction Equipment

Prior to the initial construction of the proposed project, Mine Reclamation Corporation should evaluate the feasibility of operating heavy-duty Diesel construction equipment with engines which are certified by the EPA/California Air Resources Board for use in on-highway trucks. If such engines are available and feasible, Mine Reclamation Corporation should operate the construction equipment with equivalent on-highway engines, unless (1) there is no suitable engine available; or (2) the mounting and installation requirements, or duty cycle limitations, make it infeasible to use available on-highway engines in that equipment.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure MC-4: Low NOx Engine Design for Construction Equipment

For any Diesel-fueled construction equipment for which there are no suitable on-highway equivalent engines, Mine Reclamation Corporation should operate the equipment with engines which are equipped with turbochargers and intercoolers (or aftercoolers). In addition, Mine Reclamation Corporation should maintain these engines with the fuel injection timing retarded to a level recommended by the engine manufacturer for reduced NOx emissions, but will not result in excessive visible smoke emissions.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure MC-5: Electrification of Asphalt Plant

Mine Reclamation Corporation should use an electric version of the temporary asphalt plant, unless the distance between a suitable power source and the asphalt plant makes it infeasible for this equipment.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure MC-6: Electrification of Concrete Batch Plant

Mine Reclamation Corporation should use an electric version of the temporary concrete batch plant, unless the distance between a suitable power source and the concrete batch plant makes it infeasible for this equipment.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure MC-7: Unpaved Road and Parking Lot Surfaces

Mine Reclamation Corporation should apply chemical dust suppressants and/or water as a dust suppressant to all unpaved road and parking lot surfaces during construction operations. The chemical dust suppressant should be selected based on a field evaluation of candidate suppressants conducted upon startup of the project.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure MC-8: Paved-Road Travel

Mine Reclamation Corporation should maintain a 2-foot freeboard height and/or cover trucks using offsite paved haul roads.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure MC-9: Soil/Aggregate Excavation

Mine Reclamation Corporation should pre-water all areas where soil/aggregate excavation will take place.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure MC-10: Asphalt Plant

Mine Reclamation Corporation should install and operate water sprays or filters on all asphalt plant aggregate open transfer points.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure MC-11: Concrete Batch Plant

Mine Reclamation Corporation should install and operate water sprays or filters on all concrete batch plant aggregate, sand, and portland cement open transfer points.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure MC-12: Wind Erosion

As needed, Mine Reclamation Corporation should compact and treat with a chemical dust suppressant or protect with a fabric cover all inactive areas disturbed by construction activities to minimize wind erosion.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure MC-13: Permanent Road Surfaces

Mine Reclamation Corporation should periodically clean with vacuum sweepers and/or water flush all paved roads used by haul trucks to minimize the buildup of loose surface material.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

Mitigation Measure MC-14: Blow Sand Areas

Mine Reclamation Corporation should chemically stabilize blowsand areas adjacent to paved haul roads in the project area.

Implemented by:	Mine Reclamation Corporation
Monitoring/Reporting Agencies:	Riverside County Planning Department South Coast AQMD

B.4. Estimation of Emissions with Mitigation Measures

Tables B-1 through B-5 show the estimated daily heavy equipment exhaust and fugitive dust emissions with recommended mitigation measures. Table B-6 shows the total daily emissions associated with construction of the Proposed Project. The data show that the recommended mitigation measures have the greatest benefits for reducing emissions of particulates, oxides of nitrogen, and sulfur dioxide. The particulate reductions are due to recommended dust suppression mitigation measures for the excavation areas and unpaved haul roads. The oxides of nitrogen reductions are due to the use of low NOx emitting engines in construction equipment. The sulfur dioxide reductions are due to the use of ultra-low sulfur fuel in all Diesel burning construction heavy equipment. The use of this fuel results in associated reductions in particulate matter emissions as well.

Table B-1
Heavy Equipment Exhaust Emissions
(excluding equipment directly associated with landfill area and Townsite)

Heavy Equipment Exhaust Emissions

Equipment Type	Number	Hr/Day	Gal/Hr(1)	Emission Factors(2) (lb/1000 gal) NOx	CO	PM	HC	SO2	Emissions (lb/day) NOx	CO	PM	HC	SO2
Bulldozers	7	8	9.0	226.65	39.13	12.99	11.74	7.10	114.2	19.7	6.5	5.9	3.6
Frontend Loaders	4	8	7.0	226.65	39.13	12.99	11.74	7.10	50.8	8.8	2.9	2.6	1.6
Dump Trucks	16	8	9.5	131.03	74.35	3.25	11.74	7.10	159.3	90.4	3.9	14.3	8.6
Motor Graders	4	8	6.0	226.65	39.13	12.99	11.74	7.10	43.5	7.5	2.5	2.3	1.4
Compactors	4	8	10.5	226.65	39.13	12.99	11.74	7.10	76.2	13.1	4.4	3.9	2.4
Backhoes	3	8	2.5	226.65	39.13	12.99	11.74	7.10	13.6	2.3	0.8	0.7	0.4
Scrapers	18	8	15.5	226.65	39.13	12.99	11.74	7.10	505.9	87.3	29.0	26.2	15.8
Water Trucks	4	8	11.0	131.03	74.35	3.25	11.74	7.10	46.1	26.2	1.1	4.1	2.5
Paving Machines	3	8	3.0	226.65	39.13	12.99	11.74	7.10	16.3	2.8	0.9	0.8	0.5
Rail Laying Machine(3)	2	8	4.5	226.65	39.13	12.99	11.74	7.10	16.3	2.8	0.9	0.8	0.5
Asphalt Plant Heaters(4)	1	8	200	0.036	0.038	0.0032	0.028	0.0146	57.6	60.8	5.1	44.8	23.4
Generators(5)	2	8		0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0
								Total =	1099.8	321.9	58.2	106.5	60.7

Footnotes:

(1) Heavy equipment hourly fuel consumption from "Caterpillar Performance Handbook", October 1989, assuming medium load factor
(2) Based on low NOx Diesel engines using 0.05% sulfur fuel
(3) Heavy equipment hourly fuel consumption from "Caterpillar Performance Handbook", October 1989, assuming medium load factor, assuming same fuel consumption as for Caterpillar Model 571G pipelayer
(4) Hourly process rate in terms of tons of asphalt/hr rather than gallons of fuel/hr. Emission factors in terms of lbs/ton rather than lb/1000 gal. Emission factors from AP-42, Section 8.1 (Asphaltic Concrete Plants), Tables 8.1-4 and 8.1-5 assuming a fuel sulfur content of 0.05% and PM10 emissions controlled with a baghouse.
(5) Based on use of utility supplied power

Table B-2
Fugitive Dust Emissions
(excluding equipment directly associated with landfill area and Townsite)

Fugitive Dust Emissions

Activity	Daily Process Rate	Units	Emission(1) Fector (lb/unit)	TSP Emission Rate (lb/day)	PM10/TSP(2)	Uncontrolled PM10 Emission Rate (lb/dey)	Control(4) Efficiency (%)	Controlled PM10 Emission Rete (lb/dey)
Dump Truck Heuling	991	VMT	18.414	18245.3	0.36	6568.3	95	328.4
Scraper Heuling	171	VMT	20.544	3514.1	0.36	1265.1	95	63.3
Screper Excevation	144	Hrs	34.232	4929.4	0.28	1380.2	90	138.0
Buildozer Excavation	56	Hrs	34.232	1917.0	0.28	536.8	90	53.7
Frontend Loeder Operetion	32	Hrs	0.040	1.3	0.77	1.0	30	0.7
Backhoe Operetion	24	Hrs	0.040	1.0	0.77	0.7	30	0.5
Greder Operetion	32	Hrs	0.230	7.4	0.54	4.0	50	2.0
Betch Loading Dump Trucks	7438	Tons	0.002	17.4	0.35	6.1	0	6.1
Batch Unloeding Trucks/Screpers	14875	Tons	0.002	34.9	0.35	12.2	0	12.2
Concrete Betch Plent								
Aggregete Bin Loading	155	Tons	0.029	4.5	0.35	1.6	80	0.3
Portland Cement Bin Loeding	25	Tons	0.270	6.8	0.35	2.4	95	0.1
Weigh Hopper Loeding	180	Tons	0.020	3.6	0.35	1.3	95	0.1
Mixer Loading	180	Tons	0.040	7.2	0.35	2.5	95	0.1
Asphelt Plent								
Transfer Points(3)	1600	Tons	0.007	11.2	0.35	3.9	95	0.2
Betch Loading(3)	1600	Tons	0.002	3.7	0.35	1.3	80	0.3
Wind Erosion								
Road Extensions	47850	Sq. Ft.	0.010	459.6	0.5	229.8	0	229.8
Conteiner Handling Facility	76125	Sq. Ft.	0.010	731.2	0.5	365.6	0	365.6
Relt Reconstruction	34674	Sq. Ft.	0.010	333.1	0.5	166.5	0	166.5
							Totel =	1367.9

Footnotes:

(1) a. Betch loeding end unloeding emission fector is computed from AP-42, 11.2.3-3 (Aggregate Hendling), with 8.3 mph everege wind speed (from onsite monitor) end 4% moisture content

b. Unpaved road trevel emission fector is computed from AP-42, 11.2.1 (Unpeved Roads), with silt content of 6%, everege vehicle speed of 25 mph, number of days of reinfall equels 20 (from Figure 11.2.1-1), everege screper weight of 67 tons, everege dump truck weight of 30 tons

c. Screper end Buildozer spreading/excevation emission fectors computed from AP-42, 8.24-5 (Buildozing Overburden) essuming 20% silt content end 4% moisture content. Greder, frontend loader, end backhoe emission factors computed from AP-42, 8.24-5 (Western Surfece Coel Mines), with vehicle speed of 2 mph for greder, vehicle speed of 1 mph for backhoe end loeder.

d. Conveyor transfer point emission fector computed from AP-42, 11.2.3-3, 1988 (Aggregete Hendling and Storege Piles, continuous drop), everege wind speed = 8.3 mph (from onsite monitor), essumed 4% moisture content

e. Wind erosion dust emission fector computed from EPA's Control of Open Fugitive Dust Sources, September 1988, EPA# 450/3-88-008, using threshold friction velocity of 0.32 m/sec, roughness height of 0.000731 m (from Teble 6-2, disturbed desert), end fastest mile wind speed of 24.5 m/s (maximum one-hour everage wind speed recorded by onsite monitor (47.4 mph) converted to festest mile speed)

(2) e. Unpeved road PM10 fector from AP-42, 11.2.1 (Unpaved Roads)

b. Batch loading end unloading PM10 fector from AP-42, 11.2.3-3 (Aggregate Handling)

c. Trensfer point PM10 fector from AP-42, 11.2.3-3 (Aggregate Handling)

d. The PM10 conversion factor for greder, beckhoe, end loeder from AP-42, 8.24-5 (Western Surface Coal Mines, grading)

e. The PM10 conversion factor for buildozer end screper from AP-42, 8.24-5 (Western Surface Coal Mines, buildozing)

f. The PM10 conversion fector for wind erosion from EPA's Control of Open Fugitive Dust Sources, September 1988, EPA# 450/3-88-008

g. Concrete batch plant loading and unloading PM10 factor from AP-42, 11.2.3-3 (Aggregete Hendling)

(3) Assuming three conveyor trensfar points and a single batch loading point for eggregate

(4) e. Unpaved road travel control efficiency from eppliceton of chemicel dust suppressant over unpaved road, see "Evaluetion of the Effectiveness of Chemicel Dust Suppressants on Unpaved Roads," MRI, Nov. 1987, page 61

b. Asphalt end concrete batch plent trensfer points control etficiency from installation of enclosed trensfer points vented to beghouse (estimated from vendor literature end MD-20 "Control of Particulate Emissions" for pulse-jet beghouses)

c. Asphelt and concrete batch plent eggregete bin loading end batch loading control efficiency from inspection of dump hoppers equipped with hollow cone sprey nozzles

d. Buildozer end screper excevetion control fectors ere estimeted from field date collected during the excevetion of tellings at a former esbestos mine neer Copperopolis, Californie.

e. Control fectors associated with water applicetion.

Table B-3
Heavy Duty Equipment Exhaust Emissions
(equipment directly associated with landfill area)

Eagle Mountain Landfill and Recycling Center
Onsite Mobile Equipment Exhaust Emissions
Directly Associated with Landfill Area

	Operating Data			Emission Factors (lb/1000 gal)(1)					Daily Emissions (lbs/day)				
	Number	Hrs/Day	Gals/Hr	NOx	CO	PM10	VOC	SO2	NOx	CO	PM10	VOC	SO2
DUST CONTROL AND ROAD MAINTENANCE													
Water Tanker	7	10	11	131.03	74.35	3.25	11.74	7.10	100.89	57.25	2.50	9.04	5.47
Motor Grader	3	10	6	226.65	39.13	12.99	11.74	7.10	40.80	7.04	2.34	2.11	1.28
Crawler Tractor	1	10	9	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64
Vacuum Sweeper	2	10	11	131.03	74.35	3.25	11.74	7.10	28.83	16.36	0.71	2.58	1.56
LINER CONSTRUCTION CLAY MATERIAL													
Frontend Loader	1	10	7	226.65	39.13	12.99	11.74	7.10	15.87	2.74	0.91	0.82	0.50
Haul Truck	1	10	6	131.03	74.35	3.25	11.74	7.10	7.86	4.46	0.19	0.70	0.43
Crawler Tractor	1	10	9	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64
Compactor	1	10	10.5	226.65	39.13	12.99	11.74	7.10	23.80	4.11	1.36	1.23	0.75
LINER CONSTRUCTION AGGREGATE MATERIAL													
Frontend Loader	2	10	12	226.65	39.13	12.99	11.74	7.10	54.40	9.39	3.12	2.82	1.70
Haul Truck	3	10	9.5	131.03	74.35	3.25	11.74	7.10	37.34	21.19	0.93	3.35	2.02
Crawler Tractor	1	10	9	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64
Compactor	1	10	10.5	226.65	39.13	12.99	11.74	7.10	23.80	4.11	1.36	1.23	0.75
BENCH CLEARING													
Crawler Tractor	1	10	9	226.65	39.13	12.99	11.74	7.10	20.40	3.52	1.17	1.06	0.64
MISCELLANEOUS													
Backhoe	2	10	2.5	226.65	39.13	12.99	11.74	7.10	11.33	1.96	0.65	0.59	0.36
Utility Truck	3	10	5	131.03	74.35	3.25	11.74	7.10	19.65	11.15	0.49	1.76	1.07
Grader	1	10	6	226.65	39.13	12.99	11.74	7.10	13.60	2.35	0.78	0.70	0.43
								TOTAL =	459.8	156.2	20.0	31.2	18.9

Footnote:

(1) Assumptions used for emission calculations discussed in Part 5 of Air Quality Impact Section.

Table B-4
Fugitive Dust Emissions
(directly associated with landfill area)

Eagle Mountain Landfill and Recycling Center
Fugitive Dust Emissions
Directly Associated with Landfill Area

Activity	Operating Data: Daily Process Rate	Units	TSP Emissions: Emission Factor(1) (lbs/unit)	Control Factor(1) (%)	Emission Rate (lbs/day)	PM10 Emissions: PM10 Conversion Factor(1)	PM10 Emission Rate (lbs/day)
Liner Material Hauling (Clay)	61	vmt	3.87	95%	11.8	0.45	5.3
Liner Material Excavation (Rock)	20	hr	5.70	90%	11.4	0.13	1.5
Liner Material Truck Loading (Rock)	8066	ton	0.00	0%	4.8	0.47	2.3
Liner Material Hauling (Rock)	206	vmt	5.63	95%	58.1	0.45	26.2
Liner Material Dumping (Rock)	8066	ton	0.00	0%	4.8	0.47	2.3
Liner Material Spreading (Rock)	10	hr	7.04	0%	70.4	0.13	9.3
Road Watering	490	vmt	1.31	95%	32.2	0.45	14.5
Paved Road Vacuuming	100	vmt	1.17	95%	5.8	0.20	1.1
Road Grading	60	vmt	0.23	60%	5.4	0.54	2.9
Road Blading	10	hr	4.36	0%	43.6	0.13	5.7
Bench Clearing	10	hr	5.70	30%	39.9	0.16	6.5
Backhoe	20	hr	0.04	30%	0.6	0.77	0.4
Utility Truck Travel	150	vmt	0.26	95%	1.9	0.45	0.9
Grader	20	vmt	0.23	60%	1.8	0.54	1.0
Windblown Dust (Unpaved Haul Roads)	506,880	sq.ft.	0.00001	0%	5.8	0.50	2.9
Windblown Dust (Liner Borrow Area- Rock)	10,875	sq.ft.	0.00001	0%	0.1	0.50	0.1
Windblown Dust (Liner-Rock)	21,750	sq.ft.	0.00001	0%	0.3	0.50	0.1
Material Crushing Plant	308	ton	0.05	99%	0.2	0.88	0.2
Material Screening Plant	7,759	ton	0.04	99%	3.9	0.84	3.2
				TOTAL =	303.0		86.4

Footnotes:
(1) Assumptions used for emission calculations discussed in Part 5 of Air Quality Impact Section.

Table B-5
Equipment Exhaust and Dust Emissions
Townsite Construction

Eagle Mountain Landfill and Recycling Center
Equipment Exhaust and Dust Emissions
Townsite Construction

Dwelling	Number of Dwellings	Construction Period (days)	Gross Floor Area Per Dwelling(1) (sq.ft./dwelling)	Emission Factors(2) NOx (lbs/msf)	CO (lbs/msf)	PM10 (lbs/msf)	VOC (lbs/msf)	SOx (lbs/msf)	Daily Emissions NOx (lbs/day)	CO (lbs/day)	PM10 (lbs/day)	VOC (lbs/day)	SOx (lbs/day)
Single Family Units	283	140	1750	347.7	75.6	24.7	23.7	0.0	1230.1	267.5	87.3	83.7	0.0
Multiple Family Units	37	140	8000	322.9	70.2	22.9	22.0	0.0	682.7	148.5	48.5	46.5	0.0
								Total =	1912.8	416.0	135.8	130.1	0.0

Footnotes:
(1) Gross Floor Area (GFA) per single family unit from Table 9-5, SCAQMD "CEQA Air Quality Handbook", April 1993. GFA for multiple family units is an estimate.
(2) From Table 9-1, SCAQMD "CEQA Air Quality Handbook", April 1993.

Table B-6
Total Construction Emissions

Operations	Total Construction Emissions (lbs/day) NOx	CO	PM10	VOC	SO2
Construction Equipment Combustion Emissions (excluding equipment directly associated with landfill area and Townsite)	1,100	322	58	107	61
Construction Equipment Combustion Emissions (equipment directly associated with landfill area)	460	156	20	31	19
Fugitive Dust (excluding operations directly associated with landfill area and Townsite)			1,368		
Fugitive Dust (operations directly associated with landfill area)			86		
Construction Equipment Combustion Emissions and Fugitive Dust (equipment directly associated with Townsite improvements)	1,913	416	136	130	0
Total	3,473	894	1,668	268	80

Attachment C

Screening Level Health Risk Assessment

Attachment C
Screening Level Health Risk Assessment
Eagle Mountain Landfill and Recycling Center

C.1. Introduction

The following paragraphs discuss the results of the screening level risk assessment for the proposed Eagle Mountain Landfill and Recycling Center. This screening level risk assessment analyzes the chronic health risk due to long-term, low-level exposures. Acute health risks were not evaluated for two reasons. First, the project is not expected to generate large, short-term toxic air pollutant releases that would result in high groundlevel concentrations. The primary source of pollutants, which will be discussed later in this report, is landfill gas seepage from the landfill. Emissions through the surface of the landfill and from the flares will occur at a relatively uniform release rate. Acute risks are generally associated with accidental releases or with short-term, high mass flow releases, such as those from sterilization or fumigation processes, which may be coupled with adverse meteorological conditions. The possibility of a large release of unburned landfill gas from the flares is remote. In the event of a flame-out in the flares, the landfill gas blowers would shut down immediately thereby preventing the release of raw landfill gas. The flares then would attempt to restart automatically. If the flame could not be reinitiated, the blowers would stay off until an operator could correct the equipment malfunction.

C.2. Emission Sources Analyzed

The following equipment/activities at the proposed project may emit carcinogenic air pollutants and have been included in the screening level risk assessment:

- Landfill gas collection system
- Landfill gas flares
- Fugitive landfill gas leaks from surface of landfill
- Leachate/condensate storage tanks
- Gasoline storage and dispensing operations
- Emergency natural gas-fired generators
- Diesel equipment operated at the landfill site
- Gasoline vehicles operated at the Eagle Mountain Townsite

C.3. Choice of Models

Both simple and complex terrain models were used to investigate potential impacts of toxic air pollutants from the proposed equipment/activities, due to the variability of terrain in the vicinity of the project. A number of EPA-approved air quality dispersion models were available to conduct analyses for both the simple and complex terrain surrounding the Eagle Mountain site. ISCST3 is the EPA's recommended

model for point and area sources in simple and complex terrain. The emergency generators and landfill gas flares are clearly point sources. The landfill gas collection system, leachate/condensate storage tanks, and gasoline storage and dispensing operations were also represented as point sources in this analysis. Fugitive landfill gas leaks from the surface of the landfill, Diesel onsite equipment, and gasoline vehicles at the Eagle Mountain Townsite were analyzed as area sources.

As discussed in more detail in the following section on emission rates, the emissions from the landfill gas collection system are due to pipeline component leaks associated with the gas blower units. Each blower system will be enclosed in a building equipped with a single exhaust vent. Therefore, each blower building represents a separate point source.

The emissions from the leachate/condensate collection system are due to evaporation from leachate/condensate temporarily stored in aboveground tanks. Because each leachate/condensate storage tank is equipped with a single vent pipe, each tank was modeled as a separate point source.

The gasoline storage and dispensing operations will be equipped with Phase I and II vapor collection systems which route gasoline vapors back to the gasoline storage tanks. For these operations, it was assumed that the emissions originate from the vent pipes on the gasoline storage tanks. Therefore, each gasoline storage tank was modeled as a separate point source. The source types used for the screening level risk assessment are shown below.

Source Characterization
Eagle Mountain Landfill and Recycling Center
Screening Level Risk Assessment

Type of Source	Emission Source	Type of Terrain	Model Used
Point	Flares, Emergency Generators, Leachate/Condensate Storage Tanks, Gasoline Storage Tanks, Landfill Gas Blower Units	Simple/ Complex	ISCST3
Area	Fugitive Leaks from Landfill Surface, Diesel Landfill Equipment, Vehicles at Townsite	Simple/ Complex	ISCST3

C.4. Stack Parameters

For each emission source, ISCST3 input requirements include the source location, the source elevation, stack height, stack diameter, stack exit temperature and velocity,

and emissions. Table C-1 summarizes the source characterizations used for this analysis. The emissions associated with each unit are discussed in more detail in the following section on emission rates.

Table C-1
Eagle Mountain Landfill and Recycling Center
Risk Assessment Operating Conditions

Emission Source	Modeling Parameters				
	Averaging Period	Release Height (meters)	Exhaust Temperature (K)	Stack Diameter (meters)	Exhaust Velocity (m/sec)
Flares	Annual	22.9	1144	3.7	13.3
Fugitive Landfill Gas	Annual	2.5	N/A	N/A	N/A
Landfill Gas Blower Systems	Annual	2.1	298	0.59	2.0
Leachate/Condensate Storage Tanks	Annual	2.7 (small tank) 4.3 (large tank)	298	0.06	0.1
Gasoline Storage Tanks	Annual	2.5	298	0.06	2.0
Emergency Generators	Annual	3.0	978	0.06	5.5
Diesel Landfill Equipment	Annual	5.0	N/A	N/A	N/A
Vehicles at Townsite	Annual	5.0	N/A	N/A	N/A

C.5. Emission Rates

C.5.1 Landfill Gas Flares And Gas Collection System

The emission rates of toxic substances from the landfill gas flares, landfill gas collection system, and fugitive landfill gas leaks were based on the toxic concentrations found in landfill gas from 340 existing municipal solid waste landfills located in California. As required by AB3525, AB3374, and AB2588, these substances were tested and reported to the California Air Resources Board (CARB). The concentrations vary widely among the tested sites and among the reported substances, as shown in Attachment C-1. To estimate the probable health risks for the Proposed Project, the average concentration of each pollutant from the 340 sites was used in the risk assessment.

The emissions associated with the landfill gas collection system are due to fugitive gas leaks at pipeline components. Only pipeline components on the discharge side of the blower units are under positive pressure. Therefore, in order to estimate fugitive emissions for the landfill gas collection system, it was necessary to count the expected

number of pipeline components on the discharge side of the blower units. Types of pipeline components that may emit hydrocarbon emissions include valves and flanges. Emission factors determined from a study done by the American Petroleum Institute (API) were used to estimate fugitive emissions from the landfill gas collection system. The detailed emission calculations are shown in Attachment C-2 and include the count of each category of pipeline component and the corresponding hydrocarbon emission estimate for each type of component. The location of the landfill gas blower units is shown in Figure C-1.

The emission estimates for the landfill gas flares assume that the flares destroy 98 percent of the toxic hydrocarbons contained in the raw landfill gas. This hydrocarbon destruction efficiency was supplied by the flare vendor. The detailed emission calculations for the flares are shown in Attachment C-3. The location of the flares is shown in Figure C-1.

As discussed in more detail in Part 5, as a result of the stringent design and monitoring requirements of SCAQMD and EPA municipal solid waste landfill regulations, the landfill gas collections system will be required to capture at a minimum at least 90% of the gas generated. To account for the worst-case fugitive landfill gas emissions, this analysis assumes that 10% of the landfill gas generated escapes into the atmosphere. The detailed emission calculations for fugitive landfill gas emissions are shown in Attachment C-3.

C.5.2 Leachate/Condensate Collection System

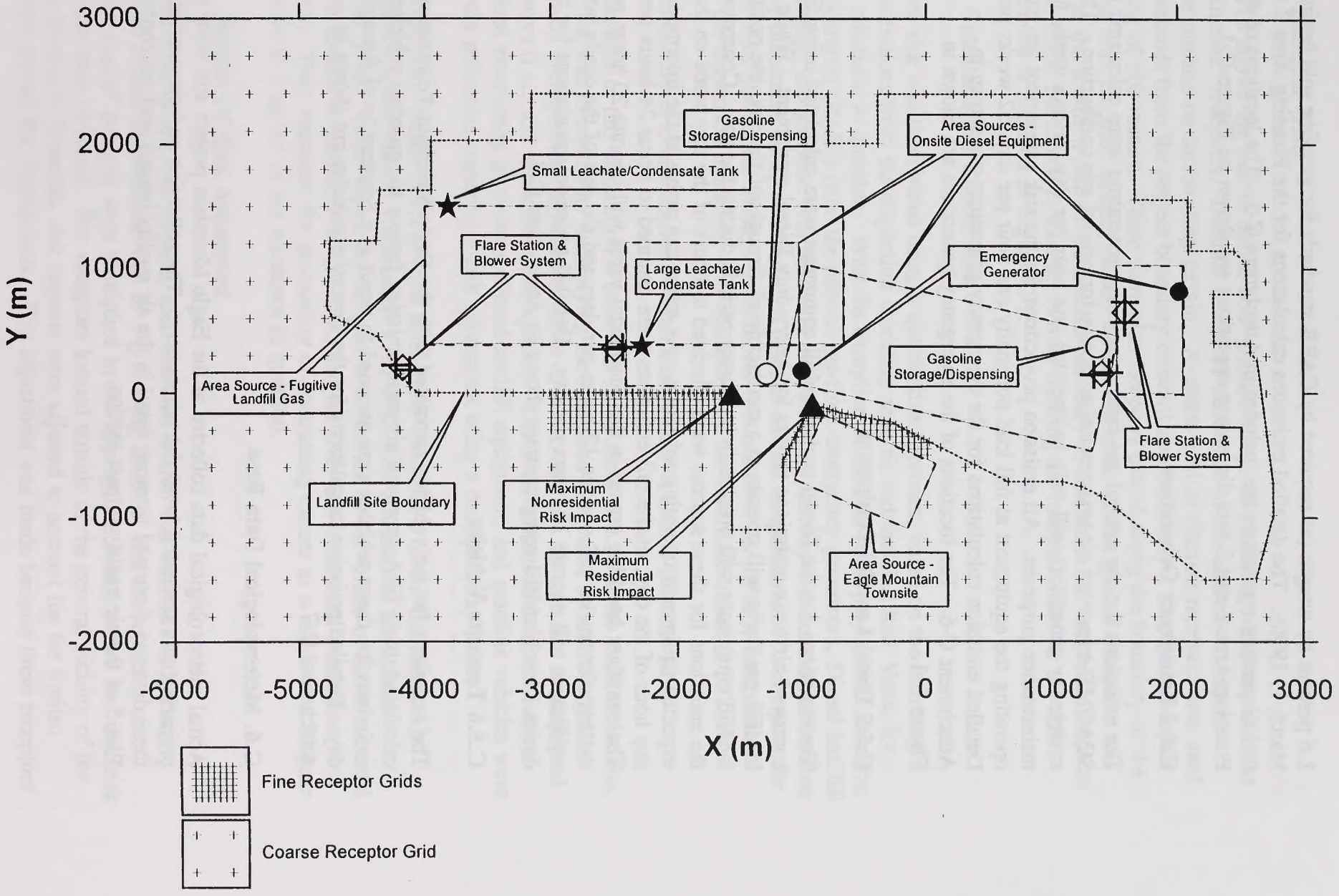
The emissions associated with the leachate/condensate collection and storage system are due to the storage of leachate/condensate in aboveground storage tanks. The evaporative emissions from the leachate/condensate storage tanks were estimated using the EPA's Hazardous Waste Treatment, Storage and Disposal Facilities Air Emissions Model (CHEMDAT7). The CHEMDAT7 model requires information regarding the type of organic material present in the stored liquid. The organic content of the stored liquid was determined from an EPA study of municipal landfill condensate ("Municipal Landfill Gas Condensate", October 1987, PB88-113246). The EPA study did not include organic concentrations for leachate. Therefore, for emission calculation purposes it was assumed that the combination leachate/condensate storage tanks held only condensate. This results in an overestimation of evaporative organic emissions because, according to discussions with the Los Angeles County Sanitation District, condensate typically has a volatile organic content that is approximately 1000 times that of leachate. The detailed emission calculations are included as Attachment C-4. The location of the leachate/condensate storage tanks is shown in Figure C-1.

C.5.3 Gasoline Storage And Handling

The emissions from the gasoline storage and dispensing operations are based on EPA emission factors for gas stations equipped with Phase I and II controls. In order to estimate the benzene emissions from these operations, it was assumed that the gasoline contained a maximum benzene content of 1.2 percent by volume, or

Figure C-1

Eagle Mountain Landfill and Recycling Center
Location of Sources and Receptors



1.6 percent by weight (as required by CARB standards for gasoline sold beginning March 1, 1996). The detailed emissions calculations for the Planning Area 2 and 3 fuel dispensing operations are included in Attachment C-5. The locations of the Planning Area 2 and 3 fuel dispensing operations are shown on Figure C-1.

C.5.4 Emergency Generators

The emissions for the natural gas-fired emergency generators were calculated using SCAQMD-approved air toxic emission factors for natural gas combustion. The emergency generators will only be operated one hour per day, once a week, for maintenance purposes. All emission projections for the risk assessment are based on operating the equipment at full load nominally one hour per day, 52 weeks per year. Detailed emission calculations for the emergency generators are shown in Attachment C-6. The locations of the emergency generators are shown in Figure C-1.

C.5.5 Diesel Landfill Equipment

The emissions for the Diesel onsite landfill equipment were calculated using EPA-approved air toxic emissions factors for heavy-duty Diesel equipment. While the landfill gas flares will operate at a constant level throughout the day, the onsite Diesel landfill equipment will operate over shorter periods during the day. Consequently, the emissions for these sources were allocated to hours of the day based on the expected equipment operating schedules. As trains can arrive at the intermodal yards any hour of the day, onsite rail emissions were assumed to occur 24 hours per day. The container handling cranes in the intermodal yards will operate 20 hours per day, the transfer trucks will operate 12 hours per day, and the rest of the onsite landfill equipment will operate 10 hours per day. Detailed emission calculations for the onsite Diesel landfill equipment are shown in Attachment C-7.

C.5.6 Townsite Vehicles

The emissions for the vehicles associated with the Eagle Mountain Townsite were calculated using EPA-approved air toxic emission factors for gasoline vehicles. The emissions for these vehicles were assumed to occur at a constant level throughout the day. Detailed emission calculations for the Townsite vehicles are shown in Attachment C-7.

C.6. Meteorological Data Base

Actual meteorological data collected at the Eagle Mountain project site were used in preparing this screening level risk assessment. The collection and preparation of these data are discussed in more detail in the air quality impact analysis contained in Part 5 of the air quality impact section.

C.7. Receptor Grid

ISCST3 allows the user to define both gridded arrays of modeling receptors and sets of "discrete" receptors. Discrete receptors were used in this analysis to capture plume impacts on surrounding terrain. A coarse grid of discrete receptors was used that extends from the project boundary outward approximately 1 km, with receptor spacing of 300 meters. There were also receptors placed along the boundary of the project with receptor spacing of 300 meters and less. A fine grid of receptors was used at the southern side of the landfill boundary to determine the maximum impacts on the Eagle Mountain Townsite. A map showing the receptors used in the risk assessment is included as Figure C-1.

C.8. Calculation of Cancer Risk

Cancer risk was determined using a quantitative approach, based on the estimated concentrations from the dispersion modeling analysis and the Unit Risk Value for each substance in question. With the exception of the risk from polynuclear aromatic hydrocarbons (PAHs) from the natural-gas-fired emergency generators, Diesel landfill equipment, and gasoline vehicles, only the inhalation pathway was considered because all the substances being evaluated are gases at normal temperatures. To compute the cancer risk, the annual average groundlevel concentration (in $\mu g/m^3$), determined from the dispersion modeling, was multiplied by the Unit Risk Value as follows:

$$\text{Groundlevel Concentration} \times \text{Unit Risk Value} = \text{Excess Lifetime Risk}$$

An example of this calculation is shown in Attachment C-8. For the PAH emissions, total risk was estimated by multiplying the inhalation risk value by an SCAQMD-approved multipathway adjustment factor of 8.6 to account for risk due to additional pathways (i.e., soil ingestion, plant uptake). The PAH emissions from the natural-gas-fired emergency generators, Diesel landfill equipment, and gasoline vehicles were the only pollutants requiring a risk adjustment using a multipathway factor.

The Unit Risk Values (URVs) were taken from Table III-6 of the California Air Pollution Control Officer Association's AB 2588 Risk Assessment Guidelines, October 1993. These values are derived from studies by the Office of Environmental Health Hazard Assessment of Cal-EPA, and the U.S. Environmental Protection Agency. They represent the probability of contracting cancer as a result of a 70-year exposure to 1 $\mu g/m^3$ of the substance in question.

C.9. Results Of Risk Assessment

To determine offsite risk impacts, each emission source was modeled with a unit emission impact (an emission rate of 1 g/s) using ISCST3, and the resulting unit impacts ($\mu g/m^3$ per g/s) were multiplied by the appropriate emission rate and unit risk value for each pollutant. For receptors located outside of the general vicinity of the Eagle Mountain Townsite, risk impacts were adjusted to account for the limited exposure period for nonresidents. This adjustment was made because these receptors

are located in uninhabited areas, which are presently zoned by the County of Riverside for mineral resources/related manufacturing uses or natural asset zones. Because of the steep topography in these areas, it is unlikely that these areas will be developed for residential use in the foreseeable future. For nonresidential receptors, risk impacts were multiplied by a factor of 0.14 to adjust exposure to 8 hours per day, 240 days per year for 46 years, rather than the residential exposure of 24 hours per day, 365 days per year for 70 years. This is the factor recommended in the AB 2588 Risk Assessment Guidelines for worker exposure. The full-length input and output modeling files are too large to include in this report. If requested, these files will be supplied on tape or floppy disk. Attachment C-9 includes abbreviated versions of the modeling files.

The probability of contracting cancer as a result of emissions from the flares, landfill gas leaks from the landfill surface, landfill gas collection system, leachate/condensate collection system, gasoline dispensing operations, emergency generators, Diesel landfill equipment, and Townsite gasoline vehicles is shown in Table C-2. As indicated in the table, the estimated maximum residential cancer risk is 5.4×10^{-6} and the estimated maximum nonresidential cancer risk is 9.7×10^{-7}. The receptors for the maximum residential and nonresidential risk impacts are located along the northern boundary of the Eagle Mountain Townsite and the southern boundary of the landfill, respectively (see Figure C-1). These values are below the applicable SCAQMD Rule 1401 cancer risk limit of ten in a million (1×10^{-5}), for facilities equipped with Best Available Control Technology for Toxics (T-BACT). Since the SCAQMD considers the use of gas collections systems with landfill gas flares as T-BACT for municipal solid waste landfills, the Proposed Project qualifies for the ten in a million risk threshold.

Table C-2
Eagle Mountain Landfill and Recycling Center
Cancer Health Effect

Maximum Residential Cancer Risk Impact	Maximum Non-Residential Cancer Risk Impact	Maximum Cancer Burden
5.4×10^{-6}	9.7×10^{-7}	0.03

The cancer burden is a measure of the number of potential cancer cases that could occur in a population exposed to cancer risks greater than 1×10^{-6}. The cancer burden is determined by multiplying the cancer risk times the number of persons living in the exposed area. A cancer burden less than one indicates that it is unlikely that one additional cancer case will develop in the vicinity of the project due to the project's operation. The South Coast Air Quality Management District, in Rule 1401, specifies that the cancer burden must be less than 0.5 for a project to be approvable. For densely populated areas, the cancer burden may be estimated for each census

tract, using the population in the tract and the cancer risk estimated to occur at the centroid of the tract. In the case of the Eagle Mountain project, the population in the vicinity of the site at full project development is small (less than 5,000 persons). Therefore, the cancer burden could be conservatively estimated by multiplying the entire populations, whether or not they are within the 1×10^{-6} risk area, times the maximum estimated cancer risk. Using this approach, the cancer burden was calculated to be 0.03, which indicates that the occurrence of even one potential cancer case in the nearby population would be unlikely.

ATTACHMENT C-1

LANDFILL GAS TOXIC SUBSTANCE CONCENTRATIONS
(From CARB's "Landfill Testing Program Data Analysis", September 1990)

TABLE 2.
CONCENTRATION STATISTICS OF SPECIFIED CONTAMINANTS AND METHANE
IN LANDFILL GAS SAMPLES

CONCENTRATION - PPBV, EXCEPT METHANE - PERCENT

COMPOUND	NUMBER OF LANDFILLS CONTAMINANT DETECTED[a]	MEDIAN	AVERAGE[b]	MAXIMUM[b]
METHANE	258	9.5	19	73
PERCHLOROETHYLENE	241	38	1,100	45,000
TRICHLOROETHYLENE	228	30	840	11,000
METHYLENE CHLORIDE	197	37	4,800	160,000
1,1,1-TRICHLOROETHANE	180	2U[c]	650	96,000
BENZENE	180	132U	2,500	480,000
VINYL CHLORIDE	160	106U	2,200	72,000
ETHYLENE DICHLORIDE	65	5.1U	600	98,000
CHLOROFORM	58	0.8U	360	11,000
CARBON TETRACHLORIDE	31	1.2U	11	2,100
ETHYLENE DIBROMIDE	24	0.3U	4	660

a. Landfill gas sampling was conducted at 340 landfills.
b. Medians and maximums of the average sampling results from individual sites.
c. U - Means non-detected; the number shown is the detection limit.

ATTACHMENT C-2

EMISSION CALCULATIONS FOR LANDFILL GAS COLLECTION SYSTEM

EAGLE MOUNTAIN LANDFILL AND RECYCLING CENTER
FUGITIVE HYDROCARBON EMISSIONS FOR LANDFILL GAS COLLECTION SYSTEM

Equipment	Type of Component	Component Type	Number of Comp.	THC Emiss. Factor per Comp.(1) (lbs/day)	Notes	THC Emiss. Factor per Comp.(2) (scf/day)	THC Emiss. per Blower System (scf/day)
Blower System #1	Valves	Butterfly	3	0.0002	(3)	0.0035	2.33
	Flanges	Flat-face	13	0.0082	(4)	0.1787	
Blower System #2	Valves	Butterfly	3	0.0002	(3)	0.0035	2.33
	Flanges	Flat-face	13	0.0082	(4)	0.1787	

Footnotes:
(1) From Table E-1, 'Onshore Gas Production Operations', for natural gas transmission, American Petroleum Institute, "Fugitive Hydrocarbon Emissions from Petroleum Production Operations", Publication Number 43322, March 1980.
(2) Calculated using a natural gas density of 0.046 lb/scf (from chemical analysis of pipeline quality natural gas from S.C. Edison).
(3) For multi-directional valve, no emission factor listed for butterfly valves due to low leak rates.
(4) For flat-face and raised-face flanges.

EAGLE MOUNTAIN LANDFILL AND RECYCLING CENTER
FUGITIVE TOXIC EMISSIONS FOR LANDFILL GAS COLLECTION SYSTEM

Toxic Gas	Mole. Weight	Landfill Gas Max. Conc.(1) (ppb)	Blower System #1 THC Emiss. Rate (scf/day)	Blower System #2 THC Emiss. Rate (scf/day)	Blower System #1 Emiss. Rate (lb/day)	Blower System #2 Emiss. Rate (lb/day)	Blower System #1 Emiss. Rate (lb/hr)	Blower System #2 Emiss. Rate (lb/hr)	Blower System #1 Emiss. Rate (g/sec)	Blower System #2 Emiss. Rate (g/sec)	Blower System Total (g/sec)
Vinyl Chloride	62.50	2200	2.33	2.33	8.5E-07	8.5E-07	3.5E-08	3.5E-08	4.4E-09	4.4E-09	8.9E-09
Benzene	78.11	2500	2.33	2.33	1.2E-06	1.2E-06	5.0E-08	5.0E-08	6.3E-09	6.3E-09	1.3E-08
Ethylene Dibromide	173.86	4	2.33	2.33	4.3E-09	4.3E-09	1.8E-10	1.8E-10	2.2E-11	2.2E-11	4.5E-11
Ethylene Dichloride	98.96	600	2.33	2.33	3.7E-07	3.7E-07	1.5E-08	1.5E-08	1.9E-09	1.9E-09	3.8E-09
Methylene Chloride	84.94	4800	2.33	2.33	2.5E-06	2.5E-06	1.0E-07	1.0E-07	1.3E-08	1.3E-08	2.6E-08
Carbon Tetrachloride	153.84	11	2.33	2.33	1.0E-08	1.0E-08	4.3E-10	4.3E-10	5.5E-11	5.5E-11	1.1E-10
Trichloroethylene	131.40	840	2.33	2.33	6.8E-07	6.8E-07	2.8E-08	2.8E-08	3.6E-09	3.6E-09	7.1E-09
Chloroform	119.39	360	2.33	2.33	2.6E-07	2.6E-07	1.1E-08	1.1E-08	1.4E-09	1.4E-09	2.8E-09
Perchloroethylene	165.83	1100	2.33	2.33	1.1E-06	1.1E-06	4.7E-08	4.7E-08	5.9E-09	5.9E-09	1.2E-08
1,1,1-Trichloroethane	133.42	650	2.33	2.33	5.3E-07	5.3E-07	2.2E-08	2.2E-08	2.8E-09	2.8E-09	5.6E-09

Footnotes:
(1) From CARB's "The Landfill Testing Program: Data Analysis and Evaluation Guidelines", September 1990, Table 2, (average concentrations).

ATTACHMENT C-3

EMISSION CALCULATIONS FOR LANDFILL GAS FLARES AND FUGITIVE LEAKS FROM LANDFILL SURFACE

Eagle Mountain Landfill and Recycling Center
Toxic Air Pollutant Emissions - Flares and Landfill Surface

Landfill Gas Production Rate =	46000	scfm
	66.24	MMscf/day
Gas Collection Efficiency =	90%	
Flare Gas Feed Rate =	41400	scfm
Fugitive Gas Release =	4600	scfm
Flare Destruction Efficiency(1) =	98.0%	

Contaminant	Mole. Weight (lb/lb-mol)	Max. Conc.(2) (ppb)	Flare Feed (lb/hr)	Flare Emission (lb/hr)	Fugitive Landfill Emission (lb/hr)	Total Emission (lb/hr)
Vinyl Chloride	62.50	2200	0.90	0.018	0.10	0.12
Benzene	78.11	2500	1.28	0.026	0.14	0.17
Ethylene Dibromide	173.86	4	0.00	0.000	0.00	0.00
Ethylene Dichloride	98.96	600	0.39	0.008	0.04	0.05
Methylene Chloride	84.94	4800	2.67	0.053	0.30	0.35
Carbon Tetrachloride	153.84	11	0.01	0.000	0.00	0.00
Trichloroethylene	131.40	840	0.72	0.014	0.08	0.09
Chloroform	119.39	360	0.28	0.006	0.03	0.04
Perchloroethylene	165.83	1100	1.19	0.024	0.13	0.16
1,1,1-Trichloroethane	133.42	650	0.57	0.011	0.06	0.07

Footnotes:
(1) From flare vendor.
(2) From CARB's "The Landfill Testing Program: Data Analysis and Evaluation Guidelines", September 1990, Table 2, (average concentrations).

ATTACHMENT C-4

EMISSION CALCULATIONS FOR
LEACHATE/CONDENSATE COLLECTION SYSTEM

Eagle Mountain Landfill and Recycling Center
Toxic Air Pollutant Emissions - Leachate/Condensate Tanks

Pollutant	Small Tank Emissions(1) (lbs/day)	Large Tank Emissions(1) (lbs/day)
Acetone	1.50E-02	3.40E-02
Benzene	3.10E-05	8.70E-05
Benzyl Alcohol	1.70E-04	3.00E-04
Cresol	7.20E-03	1.50E-02
Dibutylphthalate	9.70E-07	1.70E-06
Ethylbenzene	1.50E-04	3.90E-04
Methyl Ethyl Ketone	3.30E-06	5.80E-06
Methylene Chloride	4.90E-04	1.40E-03
Naphthalene	2.90E-04	7.70E-04
Nitrosodimethylamine-n	1.70E-05	3.10E-05
Phenol	2.30E-04	4.20E-04
Toluene	4.90E-04	1.40E-03
Tricholoroethane (1,1,1)	3.40E-04	9.40E-04
Xylene (-o)	5.80E-04	1.60E-03

Footnotes:
(1) From EPA's CHEMDAT7 model for storage of condensate.

ATTACHMENT C-5

EMISSION CALCULATIONS FOR GASOLINE DISPENSING OPERATIONS

Eagle Mountain Landfill and Recycling Center
Gasoline Storage Tanks

	Tank Throughput(1) Daily (mgals)	Annual (mgals)	VOC(2) Working Losses (lbs/mgal)	VOC(2) Breathing Losses (lbs/mgal)	VOC(2) Refueling Losses (lbs/mgal)	Working Losses (lbs/day)	Breathing Losses (lbs/day)	Refueling Losses (lbs/day)	Daily VOC Emission (lbs/day)	Benzene Content(3) (%)	Benzene Emission (lbs/day)
Gasoline Storage PA2	0.315	115.0	0.3000	1.0000	1.8000	0.09	0.32	0.57	0.98	1.60%	0.016
Gasoline Storage PA3	0.315	115.0	0.3000	1.0000	1.8000	0.09	0.32	0.57	0.98	1.60%	0.016
								Total =	1.95		

Footnotes:
(1) Throughput is worst case estimate.
(2) Emission factors from AP-42, Table 4.4-7, 9/85 for tank equipped with Phase I and II systems.
(3) From CARB gasoline standard (1.2% by volume) beginning March 1, 1996.

ATTACHMENT C-6

EMISSION CALCULATIONS FOR THE EMERGENCY GENERATORS

Toxic Emissions For Single Emergency Generator Operating At Eagle Mountain Landfill

Toxic Pollutant	Emission Factor(1) (lb/mmcf)	Engine(2) Fuel Use (mmcf/hr)	Operating Level (hrs/yr)	Annual Average Emission Rate(3) (lb/hr)
Benzene	0.0185	1.4E-03	52	1.6E-07
Formaldehyde	0.0409	1.4E-03	52	3.4E-07
PAH's	0.1964	1.4E-03	52	1.6E-06
Acetaldehyde	0.0353	1.4E-03	52	3.0E-07

Footnotes:
(1) SCAQMD approved toxic emission factors for natural gas combustion.
(2) Based on data for Kohler 100-kW generator set (model 100RZ).
(3) Adjusted for only operating 52 hours per year.

ATTACHMENT C-7

EMISSION CALCULATIONS FOR ONSITE DIESEL LANDFILL EQUIPMENT AND TOWNSITE GASOLINE VEHICLES

Eagle Mountain Landfill and Recycling Center
Toxic Air Pollutant Emissions
Proposed Project With Mitigation
Onsite Diesel Equipment

	Operating Data				Emission Factors (lbs/1000 gal)(1)			Daily Emissions (lbs/day)			Daily Emissions (g/sec)		
	Number	Hrs/Day	Gals/Hr	Days/Yr	Benzene	PAHs	Formaldehyde	Benzene	PAHs	Formaldehyde	Benzene	PAHs	Formaldehyde
PHASE I INTERMODAL													
TRUCK MARSHALING YARD													
Overhead Crane	5	20	7	365	1.29E-01	1.13E-04	3.97E+00	0.09	0.00	2.78	4.75E-04	4.15E-07	1.46E-02
Rubber-Tired Loader	1	10	2.5	365	1.29E-01	1.13E-04	3.97E+00	0.00	0.00	0.10	1.69E-05	1.48E-08	5.21E-04
Transfer Trucks	N/A	10	1	365	1.29E-01	1.13E-04	3.97E+00	0.00	0.00	0.04	6.76E-06	5.92E-09	2.08E-04
Rail	N/A	24	3.8	365	1.29E-01	1.13E-04	3.97E+00	0.01	0.00	0.37	6.24E-05	5.45E-08	1.92E-03
PHASE II INTERMODAL YARD													
Rail	N/A	24	4.8	365	1.29E-01	1.13E-04	3.97E+00	0.01	0.00	0.46	7.86E-05	6.87E-08	2.42E-03
Overhead Crane	5	20	7	365	1.29E-01	1.13E-04	3.97E+00	0.09	0.00	2.78	4.75E-04	4.15E-07	1.46E-02
WASTE HAULING FROM PHASE I INTERMODAL YARD													
Hosting Vehicle	28	10	7	365	1.29E-01	1.13E-04	3.97E+00	0.24	0.00	7.23	1.23E-03	1.08E-06	3.79E-02
WASTE HAULING FROM PHASE II INTERMODAL YARD													
Hosting Vehicle	27	10	7	365	1.29E-01	1.13E-04	3.97E+00	0.24	0.00	7.50	1.28E-03	1.12E-06	3.94E-02
LANDFILL FACE													
Crawler Tractor	12	10	13	365	1.29E-01	1.13E-04	3.97E+00	0.20	0.00	6.19	1.06E-03	9.24E-07	3.25E-02
Refuse Compactor	12	10	14	365	1.29E-01	1.13E-04	3.97E+00	0.22	0.00	6.87	1.14E-03	9.95E-07	3.50E-02
DAILY COVER EXCAVATION, HAULING AND SPREADING													
Rubber-Tired Loader	2	10	12	365	1.29E-01	1.13E-04	3.97E+00	0.03	0.00	0.95	1.63E-04	1.42E-07	5.00E-03
Haul Truck	10	10	9.5	365	1.29E-01	1.13E-04	3.97E+00	0.12	0.00	3.77	6.44E-04	5.63E-07	1.98E-02
Crawler Tractor	1	10	9	365	1.29E-01	1.13E-04	3.97E+00	0.01	0.00	0.36	6.10E-05	5.33E-08	1.88E-03
DUST CONTROL AND ROAD MAINTENANCE													
Water Tanker	7	10	11	365	1.29E-01	1.13E-04	3.97E+00	0.10	0.00	3.06	5.22E-04	4.56E-07	1.60E-02
Motor Grader	3	10	6	365	1.29E-01	1.13E-04	3.97E+00	0.02	0.00	0.71	1.22E-04	1.07E-07	3.75E-03
Crawler Tractor	1	10	9	365	1.29E-01	1.13E-04	3.97E+00	0.01	0.00	0.36	6.10E-05	5.33E-08	1.88E-03
Vacuum Sweeper	2	10	11	365	1.29E-01	1.13E-04	3.97E+00	0.03	0.00	0.87	1.49E-04	1.30E-07	4.59E-03
FINAL COVER EXCAVATION, HAULING AND SPREADING													
Rubber-Tired Loader	1	10	7	365	1.29E-01	1.13E-04	3.97E+00	0.01	0.00	0.28	4.75E-05	4.15E-08	1.46E-03
Haul Truck	3	10	6	365	1.29E-01	1.13E-04	3.97E+00	0.02	0.00	0.71	1.22E-04	1.07E-07	3.75E-03
Crawler Tractor	1	10	9	365	1.29E-01	1.13E-04	3.97E+00	0.01	0.00	0.36	6.10E-05	5.33E-08	1.88E-03
Compactor	1	10	10.5	365	1.29E-01	1.13E-04	3.97E+00	0.01	0.00	0.42	7.12E-05	6.22E-08	2.19E-03
[illegible]ER CONSTRUCTION [illegible]' MATERIAL													
[illegible]ntend Loader	1	10	7	365	1.29E-01	1.13E-04	3.97E+00	0.01	0.00	0.28	4.75E-05	4.15E-08	1.46E-03
[illegible]aul Truck	1	10	6	365	1.29E-01	1.13E-04	3.97E+00	0.01	0.00	0.24	4.07E-05	3.55E-08	1.25E-03
Crawler Tractor	1	10	9	365	1.29E-01	1.13E-04	3.97E+00	0.01	0.00	0.36	6.10E-05	5.33E-08	1.88E-03
Compactor	1	10	10.5	365	1.29E-01	1.13E-04	3.97E+00	0.01	0.00	0.42	7.12E-05	6.22E-08	2.19E-03
LINER CONSTRUCTION AGGREGATE MATERIAL													
Frontend Loader	2	10	12	365	1.29E-01	1.13E-04	3.97E+00	0.03	0.00	0.95	1.63E-04	1.42E-07	5.00E-03
Haul Truck	9	10	9.5	365	1.29E-01	1.13E-04	3.97E+00	0.11	0.00	3.39	5.80E-04	5.06E-07	1.78E-02
Crawler Tractor	1	10	9	365	1.29E-01	1.13E-04	3.97E+00	0.01	0.00	0.36	6.10E-05	5.33E-08	1.88E-03
Compactor	1	10	10.5	365	1.29E-01	1.13E-04	3.97E+00	0.01	0.00	0.42	7.12E-05	6.22E-08	2.19E-03
BENCH CLEARING													
Crawler Tractor	1	10	9	365	1.29E-01	1.13E-04	3.97E+00	0.01	0.00	0.36	6.10E-05	5.33E-08	1.88E-03
MISCELLANEOUS													
Backhoe	2	10	2.5	365	1.29E-01	1.13E-04	3.97E+00	0.01	0.00	0.20	3.39E-05	2.96E-08	1.04E-03
Utility Truck	3	10	5	365	1.29E-01	1.13E-04	3.97E+00	0.02	0.00	0.60	1.02E-04	8.88E-08	3.13E-03
Grader	1	10	6	365	1.29E-01	1.13E-04	3.97E+00	0.01	0.00	0.24	4.07E-05	3.55E-08	1.25E-03
							TOTAL =	1.7	0.0	53.8	9.18E-03	8.02E-06	2.82E-01

Footnotes:
(1) From EPA's "Toxic Air Pollutant Emission Factors - A Compilation For Selected Air Toxic Compounds And Sources", 2nd Edition, October 1990, EPA-450/2-90-011.

Eagle Mountain Landfill and Recycling Center
Toxic Air Pollutant Emissions
Townsite

	Daily Operation		Emission Factors (lbs/vmt)(1)			Daily Emissions (lbs/day)			Daily Emissions (g/sec)		
Equipment	VMT/Day	Days/Yr	Benzene	PAHs	Formaldehyde	Benzene	PAHs	Formaldehyde	Benzene	PAHs	Formaldehyde
Gasoline Vehicles	386	365	4.35E-04	9.19E-09	6.04E-05	0.17	0.00	0.02	8.83E-04	1.86E-08	1.23E-04

Footnotes:
(1) From EPA's "Toxic Air Pollutant Emission Factors - A Compilation For Selected Air Toxic Compounds And Sources", 2nd Edition, October 1990, EPA-450/2-90-011.

ATTACHMENT C-8

SAMPLE CALCULATIONS FOR ESTIMATES OF CARCINOGENIC RISK

General Calculation

Cancer Risk = Concentration ($\mu g/m^3$) $\times$ Unit Risk Value [$(\mu g/m^3)^{-1}$]

Cancer Risk for Benzene

Cancer Risk = 1.89×10^{-2} $\mu g/m^3 \times 2.9 \times 10^{-5}$ $(\mu g/m^3)^{-1}$

$= 5.48 \times 10^{-7}$

ATTACHMENT C-9

MODELING INPUT AND OUTPUT FILES

```
CO STARTING
CO TITLEONE EAGLE MTN, UNIT IMPACTS FOR RISK, FINE GRID
CO MODELOPT CONC   RURAL                        DFAULT
CO AVERTIME PERIOD
CO POLLUTID OTHER
CO [redacted]AYCOEF   0.000000E+00
CO [redacted]ERRHGTS ELEV
CO RUNORNOT RUN
CO ERRORFIL ERRORS.OUT
CO FINISHED
```

Risk modeling was conducted with four input files: two for coarse and two for fine receptor grids. Two files for each grid type were advisable in order to limit the number of source groups per run below the number of 16, the limit for which ISCST3 had been compiled for on Sierra's VAX/VMS system. This source list, for the second run for the fine grid, indicates that some sources are commented out, as indicated by double asterisks (**). Commented out sources for this fine grid run were actually processed in the other fine grid run. Source parameters are unchanged from those listed here, however. Coarse grid runs display identical source lists.

```
SO STARTING
**  LEADING LETTERS OF SOURCE NAME MEANS:
**
** UN - UNIT  (UNIT IMPACTS)

**
** Source Location Cards:
**           SRCID     SRCTYP        XS          YS          ZS
**
**SO LOCATION  UNA1        AREA      -2407.7       57.3    488.1
**SO LOCATION  UNA2        AREA      -1169.3      105.8    428.7
**SO LOCATION  UNA3        AREA       1500.0        0.0    339.3
**SO LOCATION  UNA4        AREA      -1062.8     -694.6    424.0
**SO LOCATION  UNLAND1     AREA      -4000.0      400.0    575.0
**SO LOCATION  UNEMERG1    POINT     -1005.6      180.3    425.8
**SO LOCATION  UNEMERG2    POINT      2000.3      819.1    317.5
**SO LOCATION  UNFLARE1    POINT     -4234.0      227.0    550.8
SO LOCATION  UNFLARE2    POINT     -4123.0      185.0    548.3
SO LOCATION  UNFLARE3    POINT     -2562.0      354.0    489.5
SO LOCATION  UNFLARE4    POINT     -2434.0      371.0    488.0
SO LOCATION  UNFLARE5    POINT      1318.0      152.0    343.7
SO LOCATION  UNFLARE6    POINT      1438.0      169.0    339.4
SO LOCATION  UNFLARE7    POINT      1565.0      573.0    335.5
SO LOCATION  UNFLARE8    POINT      1569.0      733.0    334.7
**SO LOCATION  UNBLOWR1    POINT     -4179.0      206.0    549.5
SO LOCATION  UNBLOWR3    POINT     -2498.0      363.0    488.8
SO LOCATION  UNBLOWR5    POINT      1378.0      161.0    341.6
SO LOCATION  UNBLOWR7    POINT      1567.0      653.0    335.1
**SO LOCATION  UNGASPA2    POINT     -1279.3      174.0    434.5
**SO LOCATION  UNGASPA3    POINT      1369.2      366.0    342.1
**SO LOCATION  UNSMLTNK    POINT     -3816.9     1532.4    736.5
**SO LOCATION  UNLRGTNK    POINT     -2308.6      393.6    488.1


** Source Parameter Cards:
** POINT:    SRCID        QS          HS      TS       VS      DS
** VOLUME:   SRCID        QS          HS    SYINIT   SZINIT
** AREA:     SRCID        QS          HS     XINIT    YINIT   ANGLE  SZINIT

**SO SRCPARAM  UNA1     2.1997588E-07      5.0   1382.8   1157.1     0.0  2.33
**SO SRCPARAM  UNA2     2.1997588E-07      5.0   2539.7    947.1   -13.0  2.33
**SO SRCPARAM  UNA3     2.1997588E-07      5.0    526.2   1027.3     0.0  2.33
**SO SRCPARAM  UNA4     1.7798593E-06      5.0    986.9    569.3   -23.5  2.33
**SO SRCPARAM  UNLAND1  2.7282822E-07      2.0   3332.1   1100.0     0.0  0.93
**SO SRCPARAM  UNEMERG1      1.000000      3.0    977.6     5.525   0.305
**SO SRCPARAM  UNEMERG2      1.000000      3.0    977.6     5.525   0.305
**SO SRCPARAM  UNFLARE1      1.000000     22.9   1144.3    13.255   3.650
SO SRCPARAM  UNFLARE2      1.000000     22.9   1144.3    13.255   3.650
SO SRCPARAM  UNFLARE3      1.000000     22.9   1144.3    13.255   3.650
SO SRCPARAM  UNFLARE4      1.000000     22.9   1144.3    13.255   3.650
SO SRCPARAM  UNFLARE5      1.000000     22.9   1144.3    13.255   3.650
SO SRCPARAM  UNFLARE6      1.000000     22.9   1144.3    13.255   3.650
SO SRCPARAM  UNFLARE7      1.000000     22.9   1144.3    13.255   3.650
SO SRCPARAM  UNFLARE8      1.000000     22.9   1144.3    13.255   3.650
**SO SRCPARAM  UNBLOWR1      1.000000   2.1336    298.0     2.      0.6879
```

```
SO SRCPARAM  UNBLOWR3     1.000000   2.1336    298.0    2.       0.6879
SO SRCPARAM  UNBLOWR5     1.000000   2.1336    298.0    2.       0.6879
SO SRCPARAM  UNBLOWR7     1.000000   2.1336    298.0    2.       0.6879
**SO SRCPARAM  UNGASPA2     1.000000     2.54    298.0    0.1      0.05715
**SO SRCPARAM  UNGASPA3     1.000000     2.54    298.0    0.1      0.05715
**SO SRCPARAM  UNSMLTNK     1.000000   2.7432    298.0    0.1      0.05715
**SO SRCPARAM  UNLRGTNK     1.000000   4.2672    298.0    0.1      0.05715

**SO BUILDHGT  UNBLOWR1  3.35      3.35      3.35      3.35      3.35      3.35
**SO BUILDHGT  UNBLOWR1  3.35      3.35      3.35      3.35      3.35      3.35
**SO BUILDHGT  UNBLOWR1  3.35      3.35      3.35      3.35      3.35      3.35
**SO BUILDHGT  UNBLOWR1  3.35      3.35      3.35      3.35      3.35      3.35
**SO BUILDHGT  UNBLOWR1  3.35      3.35      3.35      3.35      3.35      3.35
**SO BUILDHGT  UNBLOWR1  3.35      3.35      3.35      3.35      3.35      3.35

**SO BUILDWID  UNBLOWR1 12.15     12.14     11.85     12.11     12.12     12.01
**SO BUILDWID  UNBLOWR1 11.54     10.72      9.58      8.15      6.47      4.72
**SO BUILDWID  UNBLOWR1  6.59      8.26      9.69     10.81     11.61     12.06
**SO BUILDWID  UNBLOWR1 12.15     12.14     11.85     12.11     12.12     12.01
**SO BUILDWID  UNBLOWR1 11.54     10.72      9.58      8.15      6.47      4.72
**SO BUILDWID  UNBLOWR1  6.59      8.26      9.68     10.81     11.61     12.06

SO BUILDHGT  UNBLOWR3  3.35      3.35      3.35      3.35      3.35      3.35
SO BUILDHGT  UNBLOWR3  3.35      3.35      3.35      3.35      3.35      3.35
SO BUILDHGT  UNBLOWR3  3.35      3.35      3.35      3.35      3.35      3.35
SO BUILDHGT  UNBLOWR3  3.35      3.35      3.35      3.35      3.35      3.35
SO BUILDHGT  UNBLOWR3  3.35      3.35      3.35      3.35      3.35      3.35
SO BUILDHGT  UNBLOWR3  3.35      3.35      3.35      3.35      3.35      3.35

SO BUILDWID  UNBLOWR3 12.15     12.14     11.85     12.11     12.12     12.01
SO BUILDWID  UNBLOWR3 11.54     10.72      9.58      8.15      6.47      4.72
SO BUILDWID  UNBLOWR3  6.59      8.26      9.69     10.81     11.61     12.06
SO BUILDWID  UNBLOWR3 12.15     12.14     11.85     12.11     12.12     12.01
SO BUILDWID  UNBLOWR3 11.54     10.72      9.58      8.15      6.47      4.72
SO BUILDWID  UNBLOWR3  6.59      8.26      9.68     10.81     11.61     12.06

SO BUILDHGT  UNBLOWR5  3.35      3.35      3.35      3.35      3.35      3.35
SO BUILDHGT  UNBLOWR5  3.35      3.35      3.35      3.35      3.35      3.35
SO BUILDHGT  UNBLOWR5  3.35      3.35      3.35      3.35      3.35      3.35
SO BUILDHGT  UNBLOWR5  3.35      3.35      3.35      3.35      3.35      3.35
SO BUILDHGT  UNBLOWR5  3.35      3.35      3.35      3.35      3.35      3.35
SO BUILDHGT  UNBLOWR5  3.35      3.35      3.35      3.35      3.35      3.35

SO BUILDWID  UNBLOWR5 12.15     12.14     11.85     12.11     12.12     12.01
SO BUILDWID  UNBLOWR5 11.54     10.72      9.58      8.15      6.47      4.72
SO BUILDWID  UNBLOWR5  6.59      8.26      9.69     10.81     11.61     12.06
SO BUILDWID  UNBLOWR5 12.15     12.14     11.85     12.11     12.12     12.01
SO BUILDWID  UNBLOWR5 11.54     10.72      9.58      8.15      6.47      4.72
SO BUILDWID  UNBLOWR5  6.59      8.26      9.68     10.81     11.61     12.06

SO BUILDHGT  UNBLOWR7  3.35      3.35      3.35      3.35      3.35      3.35
SO BUILDHGT  UNBLOWR7  3.35      3.35      3.35      3.35      3.35      3.35
SO BUILDHGT  UNBLOWR7  3.35      3.35      3.35      3.35      3.35      3.35
SO BUILDHGT  UNBLOWR7  3.35      3.35      3.35      3.35      3.35      3.35
SO BUILDHGT  UNBLOWR7  3.35      3.35      3.35      3.35      3.35      3.35
SO BUILDHGT  UNBLOWR7  3.35      3.35      3.35      3.35      3.35      3.35

SO BUILDWID  UNBLOWR7 12.15     12.14     11.85     12.11     12.12     12.01
SO BUILDWID  UNBLOWR7 11.54     10.72      9.58      8.15      6.47      4.72
SO BUILDWID  UNBLOWR7  6.59      8.26      9.69     10.81     11.61     12.06
SO BUILDWID  UNBLOWR7 12.15     12.14     11.85     12.11     12.12     12.01
SO BUILDWID  UNBLOWR7 11.54     10.72      9.58      8.15      6.47      4.72
SO BUILDWID  UNBLOWR7  6.59      8.26      9.68     10.81     11.61     12.06

**  Hours of Day              1-2     3-7    8-12   13-17  18-22  23-24
**SO EMISFACT  UNA1    HROFDY  2*0.021 5*0.073 5*0.984 5*1.0 5*0.089 2*0.036
**SO EMISFACT  UNA2    HROFDY  2*0.021 5*0.073 5*0.984 5*1.0 5*0.089 2*0.036
**SO EMISFACT  UNA3    HROFDY  2*0.021 5*0.073 5*0.984 5*1.0 5*0.089 2*0.036
**  Emission scaling factors as originally developed for combustion-derived PM10
**  No emission scaling factor for UNA4

SO EMISUNIT   0.100000E+07 (GRAMS/SEC)          (MICROGRAMS/CUBIC-METER)

**SO SRCGROUP   ONSITE    UNA1-UNA3
**SO SRCGROUP   TOWN      UNA4
**SO SRCGROUP   LANDFILL  UNLAND1
**SO SRCGROUP   EMERG1    UNEMERG1
**SO SRCGROUP   EMERG2    UNEMERG2
**SO SRCGROUP   FLARE1    UNFLARE1
SO SRCGROUP   FLARE2    UNFLARE2
```

```
SO SRCGROUP    FLARE3    UNFLARE3
SO SRCGROUP    FLARE4    UNFLARE4
SO SRCGROUP    FLARE5    UNFLARE5
SO SRCGROUP    FLARE6    UNFLARE6
SO SRCGROUP    FLARE7    UNFLARE7
SO SRCGROUP    FLARE8    UNFLARE8
SO SRCGROUP    BLOWER1   UNBLOWR1
SO SRCGROUP    BLOWER3   UNBLOWR3
SO SRCGROUP    BLOWER5   UNBLOWR5
SO SRCGROUP    BLOWER7   UNBLOWR7
**SO SRCGROUP    GASPA2    UNGASPA2
**SO SRCGROUP    GASPA3    UNGASPA3
**SO SRCGROUP    SMLTNK    UNSMLTNK
**SO SRCGROUP    LRGTNK    UNLRGTNK
SO FINISHED

RE STARTING
RE ELEVUNIT METERS
**
**  ALL RECEPTOR ELEVATIONS INTERPOLATED FROM USGS DEM DATA FOR SALTON SEA WEST
**  QUADRANGLE, 50 METER SPACING.  TOTAL NUMBER OF RECEPTORS:  373

RE DISCCART         -3000.0   -300.0    609.0
RE DISCCART         -3000.0   -250.0    608.9
RE DISCCART         -3000.0   -200.0    608.9
RE DISCCART         -3000.0   -150.0    608.2

_________

List of receptors abbreviated to conserve space
_________


RE DISCCART         -2763.8      0.0    608.7
RE DISCCART         -2813.8      0.0    608.4
RE DISCCART         -2863.8      0.0    607.1
RE DISCCART         -2913.8      0.0    605.7
RE DISCCART         -2963.8      0.0    601.4
RE DISCCART         -3013.8      0.0    598.9

RE FINISHED

ME STARTING
ME INPUTFIL    [-.PLUVU2]EISET2E.DAT
ME ANEMHGHT    10.0 METERS
ME SURFDATA    1000  1992             SURFNAME
ME UAIRDATA    1000  1992             UAIRNAME
ME WINDCATS     1.54    3.09    5.14    8.23   10.80
**ME STARTEND 92 02 06 13  92 02 06 13
ME FINISHED

OU STARTING
OU MAXTABLE ALLAVE  50
OU FINISHED

************************************
*** SETUP Finishes Successfully ***
************************************

  *** ISCST3 - VERSION 95200 ***    *** EAGLE MTN, UNIT IMPACTS FOR RISK, FINE GRID                    ***        01/23/96
                                  ***                                                                 ***        02:56:11
                                                                                                               PAGE   1
**MODELOPTs: CONC                        RURAL  ELEV         DFAULT
                                           ***    MODEL SETUP OPTIONS SUMMARY      ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE =  F
**Model Uses NO WET DEPLETION.  WDPLETE =  F
**NO WET SCAVENGING Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses RURAL Dispersion.

**Model Uses Regulatory DEFAULT Options:
        1. Final Plume Rise.
```

2. Stack-tip Downwash.
3. Buoyancy-induced Dispersion.
4. Use Calms Processing Routine.
5. Not Use Missing Data Processing Routine.
6. Default Wind Profile Exponents.
7. Default Vertical Potential Temperature Gradients.
8. "Upper Bound" Values for Supersquat Buildings.
9. No Exponential Decay for RURAL Mode

**Model Accepts Receptors on ELEV Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates PERIOD Averages Only

**This Run Includes: 10 Source(s); 10 Source Group(s); and 343 Receptor(s)

**The Model Assumes A Pollutant Type of: OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
Model Outputs Tables of PERIOD Averages by Receptor
Model Outputs Tables of Overall Maximum Short Term Values (MAXTABLE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours
b for Both Calm and Missing Hours

**Misc. Inputs: Anem. Hgt. (m) = 10.00 ; Decay Coef. = 0.0000E+00 ; Rot. Angle = 0.0
Emission Units = (GRAMS/SEC) ; Emission Rate Unit Factor = 0.10000E+07
Output Units = (MICROGRAMS/CUBIC-METER)

**Detailed Error/Message File: ERRORS.OUT

**MODELOPTs: CONC RURAL ELEV DFAULT

*** POINT SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (USER UNITS)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	STACK HEIGHT (METERS)	STACK TEMP. (DEG.K)	STACK EXIT VEL. (M/SEC)	STACK DIAMETER (METERS)	BUILDING EXISTS	EMISSION RATE SCALAR VARY BY
UNFLARE2	0	0.10000E+01	-4123.0	185.0	548.3	22.90	1144.30	13.26	3.65	NO	
UNFLARE3	0	0.10000E+01	-2562.0	354.0	489.5	22.90	1144.30	13.26	3.65	NO	
UNFLARE4	0	0.10000E+01	-2434.0	371.0	488.0	22.90	1144.30	13.26	3.65	NO	
UNFLARE5	0	0.10000E+01	1318.0	152.0	343.7	22.90	1144.30	13.26	3.65	NO	
UNFLARE6	0	0.10000E+01	1438.0	169.0	339.4	22.90	1144.30	13.26	3.65	NO	
UNFLARE7	0	0.10000E+01	1565.0	573.0	335.5	22.90	1144.30	13.26	3.65	NO	
UNFLARE8	0	0.10000E+01	1569.0	733.0	334.7	22.90	1144.30	13.26	3.65	NO	
UNBLOWR3	0	0.10000E+01	-2498.0	363.0	488.8	2.13	298.00	2.00	0.69	YES	
UNBLOWR5	0	0.10000E+01	1378.0	161.0	341.6	2.13	298.00	2.00	0.69	YES	
UNBLOWR7	0	0.10000E+01	1567.0	653.0	335.1	2.13	298.00	2.00	0.69	YES	

**MODELOPTs: CONC RURAL ELEV DFAULT

*** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID	SOURCE IDs
FLARE2	UNFLARE2,
FLARE3	UNFLARE3,
FLARE4	UNFLARE4,
FLARE5	UNFLARE5,

FLARE6 UNFLARE6,

FLARE7 UNFLARE7,

FLARE8 UNFLARE8,

BLOWER3 UNBLOWR3,

BLOWER5 UNBLOWR5,

BLOWER7 UNBLOWR7,

**MODELOPTs: CONC RURAL ELEV DFAULT
*** DIRECTION SPECIFIC BUILDING DIMENSIONS ***

SOURCE ID: UNBLOWR3

IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK
1	3.3,	12.2,	0	2	3.3,	12.1,	0	3	3.3,	11.9,	0	4	3.3,	12.1,	0	5	3.3,	12.1,	0	6	3.3,	12.0,	0
7	3.3,	11.5,	0	8	3.3,	10.7,	0	9	3.3,	9.6,	0	10	3.3,	8.2,	0	11	3.3,	6.5,	0	12	3.3,	4.7,	0
13	3.3,	6.6,	0	14	3.3,	8.3,	0	15	3.3,	9.7,	0	16	3.3,	10.8,	0	17	3.3,	11.6,	0	18	3.3,	12.1,	0
19	3.3,	12.2,	0	20	3.3,	12.1,	0	21	3.3,	11.9,	0	22	3.3,	12.1,	0	23	3.3,	12.1,	0	24	3.3,	12.0,	0
25	3.3,	11.5,	0	26	3.3,	10.7,	0	27	3.3,	9.6,	0	28	3.3,	8.2,	0	29	3.3,	6.5,	0	30	3.3,	4.7,	0
31	3.3,	6.6,	0	32	3.3,	8.3,	0	33	3.3,	9.7,	0	34	3.3,	10.8,	0	35	3.3,	11.6,	0	36	3.3,	12.1,	0

SOURCE ID: UNBLOWR5

IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK
1	3.3,	12.2,	0	2	3.3,	12.1,	0	3	3.3,	11.9,	0	4	3.3,	12.1,	0	5	3.3,	12.1,	0	6	3.3,	12.0,	0
7	3.3,	11.5,	0	8	3.3,	10.7,	0	9	3.3,	9.6,	0	10	3.3,	8.2,	0	11	3.3,	6.5,	0	12	3.3,	4.7,	0
13	3.3,	6.6,	0	14	3.3,	8.3,	0	15	3.3,	9.7,	0	16	3.3,	10.8,	0	17	3.3,	11.6,	0	18	3.3,	12.1,	0
19	3.3,	12.2,	0	20	3.3,	12.1,	0	21	3.3,	11.9,	0	22	3.3,	12.1,	0	23	3.3,	12.1,	0	24	3.3,	12.0,	0
25	3.3,	11.5,	0	26	3.3,	10.7,	0	27	3.3,	9.6,	0	28	3.3,	8.2,	0	29	3.3,	6.5,	0	30	3.3,	4.7,	0
31	3.3,	6.6,	0	32	3.3,	8.3,	0	33	3.3,	9.7,	0	34	3.3,	10.8,	0	35	3.3,	11.6,	0	36	3.3,	12.1,	0

SOURCE ID: UNBLOWR7

IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK
1	3.3,	12.2,	0	2	3.3,	12.1,	0	3	3.3,	11.9,	0	4	3.3,	12.1,	0	5	3.3,	12.1,	0	6	3.3,	12.0,	0
7	3.3,	11.5,	0	8	3.3,	10.7,	0	9	3.3,	9.6,	0	10	3.3,	8.2,	0	11	3.3,	6.5,	0	12	3.3,	4.7,	0
13	3.3,	6.6,	0	14	3.3,	8.3,	0	15	3.3,	9.7,	0	16	3.3,	10.8,	0	17	3.3,	11.6,	0	18	3.3,	12.1,	0
19	3.3,	12.2,	0	20	3.3,	12.1,	0	21	3.3,	11.9,	0	22	3.3,	12.1,	0	23	3.3,	12.1,	0	24	3.3,	12.0,	0
25	3.3,	11.5,	0	26	3.3,	10.7,	0	27	3.3,	9.6,	0	28	3.3,	8.2,	0	29	3.3,	6.5,	0	30	3.3,	4.7,	0
31	3.3,	6.6,	0	32	3.3,	8.3,	0	33	3.3,	9.7,	0	34	3.3,	10.8,	0	35	3.3,	11.6,	0	36	3.3,	12.1,	0

**MODELOPTs: CONC RURAL ELEV DFAULT

*** DISCRETE CARTESIAN RECEPTORS ***
(X-COORD, Y-COORD, ZELEV, ZFLAG)
(METERS)

(-3000.0,	-300.0,	609.0,	0.0);	(-3000.0,	-250.0,	608.9,	0.0);
(-3000.0,	-200.0,	608.9,	0.0);	(-3000.0,	-150.0,	608.2,	0.0);
(-3000.0,	-100.0,	608.4,	0.0);	(-3000.0,	-50.0,	603.8,	0.0);
(-3000.0,	0.0,	600.3,	0.0);	(-2950.0,	-300.0,	609.0,	0.0);
(-2950.0,	-250.0,	609.0,	0.0);	(-2950.0,	-200.0,	609.0,	0.0);
(-2950.0,	-150.0,	608.9,	0.0);	(-2950.0,	-100.0,	608.9,	0.0);

List of receptors abbreviated to conserve space

(-2513.8,	0.0,	591.6,	0.0);	(-2563.8,	0.0,	587.8,	0.0);

```
(  -2613.8,      0.0,     593.5,      0.0);     (  -2663.8,      0.0,     596.3,      0.0);
(  -2713.8,      0.0,     601.9,      0.0);     (  -2763.8,      0.0,     608.7,      0.0);
(  -2813.8,      0.0,     608.4,      0.0);     (  -2863.8,      0.0,     607.1,      0.0);
(  -2913.8,      0.0,     605.7,      0.0);     (  -2963.8,      0.0,     601.4,      0.0);
(  -3013.8,      0.0,     598.9,      0.0);
*** ISCST3 - VERSION 95200 ***     *** EAGLE MTN, UNIT IMPACTS FOR RISK, FINE GRID                    ***     01/23/
                                  ***                                                               ***     02:56:
                                                                                                            PAGE

**MODELOPTs: CONC                          RURAL  ELEV          DFAULT

                        *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                        (1=YES; 0=NO)

1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1

   NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.


            *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                (METERS/SEC)

                        1.54,   3.09,   5.14,   8.23,  10.80,

                        *** WIND PROFILE EXPONENTS ***

   STABILITY                              WIND SPEED CATEGORY
   CATEGORY        1             2             3             4             5             6
      A       .70000E-01    .70000E-01    .70000E-01    .70000E-01    .70000E-01    .70000E-01
      B       .70000E-01    .70000E-01    .70000E-01    .70000E-01    .70000E-01    .70000E-01
      C       .10000E+00    .10000E+00    .10000E+00    .10000E+00    .10000E+00    .10000E+00
      D       .15000E+00    .15000E+00    .15000E+00    .15000E+00    .15000E+00    .15000E+00
      E       .35000E+00    .35000E+00    .35000E+00    .35000E+00    .35000E+00    .35000E+00
      F       .55000E+00    .55000E+00    .55000E+00    .55000E+00    .55000E+00    .55000E+00

            *** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
                        (DEGREES KELVIN PER METER)

   STABILITY                              WIND SPEED CATEGORY
   CATEGORY        1             2             3             4             5             6
      A       .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00
      B       .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00
      C       .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00
      D       .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00
      E       .20000E-01    .20000E-01    .20000E-01    .20000E-01    .20000E-01    .20000E-01
      F       .35000E-01    .35000E-01    .35000E-01    .35000E-01    .35000E-01    .35000E-01
*** ISCST3 - VERSION 95200 ***     *** EAGLE MTN, UNIT IMPACTS FOR RISK, FINE GRID                    ***     01/23/96
                                  ***                                                               ***     02:56:11
                                                                                                            PAGE  10

**MODELOPTs: CONC                          RURAL  ELEV          DFAULT

                *** THE FIRST  24 HOURS OF METEOROLOGICAL DATA ***

   FILE: [-.PLUVU2]EISET2E.DAT                  FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
   SURFACE STATION NO.:   1000                  UPPER AIR STATION NO.:   1000
                NAME: SURFNAME                               NAME: UAIRNAME
                YEAR:   1992                                 YEAR:   1992

                                FLOW    SPEED   TEMP    STAB    MIXING HEIGHT (M)    USTAR  M-O LENGTH  Z-0  IPCODE PRATE
     YEAR  MONTH  DAY  HOUR     VECTOR  (M/S)   (K)     CLASS   RURAL     URBAN      (M/S)      (M)       (M)          (mm/HR)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

      92     1     1     1      43.0    4.11    284.4     4     1600.0    1600.0    0.0000      0.0    0.0000    0    0.00
      92     1     1     2      68.0    3.80    284.5     4     1600.0    1600.0    0.0000      0.0    0.0000    0    0.00
      92     1     1     3      37.0    5.28    283.9     4     1600.0    1600.0    0.0000      0.0    0.0000    0    0.00
      92     1     1     4      15.0    6.75    283.3     4     1600.0    1600.0    0.0000      0.0    0.0000    0    0.00
      92     1     1     5     351.0    6.80    283.0     4     1600.0    1600.0    0.0000      0.0    0.0000    0    0.00
      92     1     1     6     271.0    6.30    282.8     4     1600.0    1600.0    0.0000      0.0    0.0000    0    0.00
      92     1     1     7     232.0    6.66    282.4     4     1600.0    1600.0    0.0000      0.0    0.0000    0    0.00
```

92	1	1	8	196.0	6.08	282.4	4	1600.0	1600.0	0.0000	0.0	0.0000	0	0.00
92	1	1	9	72.0	6.57	282.6	4	1600.0	1600.0	0.0000	0.0	0.0000	0	0.00
92	1	1	10	5.0	5.14	283.9	3	1600.0	1600.0	0.0000	0.0	0.0000	0	0.00
92	1	1	11	277.0	5.23	284.5	3	1600.0	1600.0	0.0000	0.0	0.0000	0	0.00
92	1	1	12	229.0	5.05	285.4	3	1600.0	1600.0	0.0000	0.0	0.0000	0	0.00
92	1	1	13	180.0	4.65	286.4	3	1600.0	1600.0	0.0000	0.0	0.0000	0	0.00
92	1	1	14	146.0	4.34	287.3	3	1600.0	1600.0	0.0000	0.0	0.0000	0	0.00
92	1	1	15	146.0	3.89	287.6	2	1600.0	1600.0	0.0000	0.0	0.0000	0	0.00
92	1	1	16	140.0	3.49	287.9	2	1600.0	1600.0	0.0000	0.0	0.0000	0	0.00
92	1	1	17	162.0	2.37	287.9	3	1600.0	1544.0	0.0000	0.0	0.0000	0	0.00
92	1	1	18	176.0	2.77	287.4	4	1600.0	1600.0	0.0000	0.0	0.0000	0	0.00
92	1	1	19	170.0	1.83	287.0	4	1600.0	1600.0	0.0000	0.0	0.0000	0	0.00
92	1	1	20	144.0	2.24	286.9	5	1600.0	1066.6	0.0000	0.0	0.0000	0	0.00
92	1	1	21	163.0	3.17	286.3	4	1600.0	1600.0	0.0000	0.0	0.0000	0	0.00
92	1	1	22	117.0	3.35	285.9	4	1600.0	1600.0	0.0000	0.0	0.0000	0	0.00
92	1	1	23	104.0	5.45	285.5	4	1600.0	1600.0	0.0000	0.0	0.0000	0	0.00
92	1	1	24	91.0	5.86	285.0	4	1600.0	1600.0	0.0000	0.0	0.0000	0	0.00

*** NOTES: STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

**MODELOPTs: CONC RURAL ELEV DFAULT
*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: FLARE2 ***
INCLUDING SOURCE(S): UNFLARE2,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
-3000.00	-300.00	0.03531	-3000.00	-250.00	0.03664
-3000.00	-200.00	0.03670	-3000.00	-150.00	0.03521
-3000.00	-100.00	0.03709	-3000.00	-50.00	0.03308
-3000.00	0.00	0.02830	-2950.00	-300.00	0.03495

List of results abbreviated to conserve space

-2950.00	-250.00	0.03529	-2950.00	-200.00	0.03683
-2950.00	-150.00	0.03726	-2950.00	-100.00	0.03612
-2950.00	-50.00	0.03409	-2950.00	0.00	0.03115
-2613.80	0.00	0.12606	-2663.80	0.00	0.12271
-2713.80	0.00	0.11517	-2763.80	0.00	0.11056
-2813.80	0.00	0.10882	-2863.80	0.00	0.10751
-2913.80	0.00	0.10626	-2963.80	0.00	0.11033
-3013.80	0.00	0.10949			

**MODELOPTs: CONC RURAL ELEV DFAULT
*** THE SUMMARY OF MAXIMUM PERIOD (8760 HRS) RESULTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

GROUP ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZFLAG)	OF TYPE	NETWORK GRID-ID
FLARE2	1ST HIGHEST VALUE IS	0.03775 AT (	-2650.00, -100.00, 609.90, 0.00)	DC	NA
	2ND HIGHEST VALUE IS	0.03761 AT (	-2800.00, 0.00, 608.70, 0.00)	DC	NA
	3RD HIGHEST VALUE IS	0.03749 AT (	-2800.00, -100.00, 608.90, 0.00)	DC	NA
	4TH HIGHEST VALUE IS	0.03741 AT (	-2763.80, 0.00, 608.70, 0.00)	DC	NA
	5TH HIGHEST VALUE IS	0.03733 AT (	-2813.80, 0.00, 608.40, 0.00)	DC	NA
	6TH HIGHEST VALUE IS	0.03726 AT (	-2950.00, -150.00, 608.90, 0.00)	DC	NA
E3	1ST HIGHEST VALUE IS	0.56323 AT (	-2450.00, -100.00, 608.60, 0.00)	DC	NA
	2ND HIGHEST VALUE IS	0.51769 AT (	-2350.00, -100.00, 604.30, 0.00)	DC	NA
	3RD HIGHEST VALUE IS	0.50959 AT (	-2500.00, -100.00, 609.10, 0.00)	DC	NA
	4TH HIGHEST VALUE IS	0.49106 AT (	-2350.00, -150.00, 606.80, 0.00)	DC	NA
	5TH HIGHEST VALUE IS	0.48854 AT (	-2300.00, -100.00, 603.00, 0.00)	DC	NA
	6TH HIGHEST VALUE IS	0.48549 AT (	-2400.00, -100.00, 605.20, 0.00)	DC	NA

FLARE4	1ST HIGHEST VALUE IS	0.47596 AT (	-2300.00,	-100.00,	603.00,	0.00)	DC	NA
	2ND HIGHEST VALUE IS	0.47331 AT (	-2350.00,	-100.00,	604.30,	0.00)	DC	NA
	3RD HIGHEST VALUE IS	0.46016 AT (	-2300.00,	-150.00,	606.20,	0.00)	DC	NA
	4TH HIGHEST VALUE IS	0.44599 AT (	-2350.00,	-150.00,	606.80,	0.00)	DC	NA
	5TH HIGHEST VALUE IS	0.44567 AT (	-2250.00,	-100.00,	600.30,	0.00)	DC	NA
	6TH HIGHEST VALUE IS	0.42273 AT (	-2763.80,	0.00,	608.70,	0.00)	DC	NA
FLARE5	1ST HIGHEST VALUE IS	0.13269 AT (	-1563.80,	0.00,	503.90,	0.00)	DC	NA
	2ND HIGHEST VALUE IS	0.13174 AT (	-1600.00,	0.00,	508.20,	0.00)	DC	NA
	3RD HIGHEST VALUE IS	0.13169 AT (	-1613.80,	0.00,	513.80,	0.00)	DC	NA
	4TH HIGHEST VALUE IS	0.13044 AT (	-1600.00,	-50.00,	500.60,	0.00)	DC	NA
	5TH HIGHEST VALUE IS	0.12982 AT (	-1650.00,	-50.00,	508.60,	0.00)	DC	NA
	6TH HIGHEST VALUE IS	0.12849 AT (	-1650.00,	0.00,	538.70,	0.00)	DC	NA
FLARE6	1ST HIGHEST VALUE IS	0.12754 AT (	-1563.80,	0.00,	503.90,	0.00)	DC	NA
	2ND HIGHEST VALUE IS	0.12638 AT (	-1600.00,	0.00,	508.20,	0.00)	DC	NA
	3RD HIGHEST VALUE IS	0.12582 AT (	-1613.80,	0.00,	513.80,	0.00)	DC	NA
	4TH HIGHEST VALUE IS	0.12575 AT (	-1600.00,	-50.00,	500.60,	0.00)	DC	NA
	5TH HIGHEST VALUE IS	0.12454 AT (	-1650.00,	-50.00,	508.60,	0.00)	DC	NA
	6TH HIGHEST VALUE IS	0.12408 AT (	-1563.80,	-46.90,	491.80,	0.00)	DC	NA

**MODELOPTs: CONC RURAL ELEV DFAULT
*** THE SUMMARY OF MAXIMUM PERIOD (8760 HRS) RESULTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

GROUP ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZFLAG)			OF TYPE	NETWORK GRID-ID
FLARE7	1ST HIGHEST VALUE IS	0.11638 AT (	-1600.00,	-50.00,	500.60,	0.00) DC	NA
	2ND HIGHEST VALUE IS	0.11621 AT (	-1613.80,	0.00,	513.80,	0.00) DC	NA
	3RD HIGHEST VALUE IS	0.11619 AT (	-1563.80,	-46.90,	491.80,	0.00) DC	NA
	4TH HIGHEST VALUE IS	0.11472 AT (	-1563.80,	0.00,	503.90,	0.00) DC	NA
	5TH HIGHEST VALUE IS	0.11456 AT (	-1650.00,	-50.00,	508.60,	0.00) DC	NA
	6TH HIGHEST VALUE IS	0.11322 AT (	-1600.00,	0.00,	508.20,	0.00) DC	NA
FLARE8	1ST HIGHEST VALUE IS	0.11548 AT (	-1563.80,	0.00,	503.90,	0.00) DC	NA
	2ND HIGHEST VALUE IS	0.11397 AT (	-1600.00,	0.00,	508.20,	0.00) DC	NA
	3RD HIGHEST VALUE IS	0.11318 AT (	-1613.80,	0.00,	513.80,	0.00) DC	NA
	4TH HIGHEST VALUE IS	0.11034 AT (	-1600.00,	-50.00,	500.60,	0.00) DC	NA
	5TH HIGHEST VALUE IS	0.11029 AT (	-1563.80,	-46.90,	491.80,	0.00) DC	NA
	6TH HIGHEST VALUE IS	0.10867 AT (	-1650.00,	0.00,	538.70,	0.00) DC	NA
BLOWER3	1ST HIGHEST VALUE IS	8.75830 AT (	-2263.80,	0.00,	569.90,	0.00) DC	NA
	2ND HIGHEST VALUE IS	8.39246 AT (	-2213.80,	0.00,	571.00,	0.00) DC	NA
	3RD HIGHEST VALUE IS	8.29843 AT (	-2350.00,	0.00,	576.40,	0.00) DC	NA
	4TH HIGHEST VALUE IS	8.27302 AT (	-2250.00,	0.00,	571.40,	0.00) DC	NA
	5TH HIGHEST VALUE IS	8.26637 AT (	-2313.80,	0.00,	576.50,	0.00) DC	NA
	6TH HIGHEST VALUE IS	8.05151 AT (	-2300.00,	0.00,	573.50,	0.00) DC	NA
BLOWER5	1ST HIGHEST VALUE IS	0.81706 AT (	16.20,	-391.40,	392.00,	0.00) DC	NA
	2ND HIGHEST VALUE IS	0.80112 AT (	0.00,	-400.00,	392.30,	0.00) DC	NA
	3RD HIGHEST VALUE IS	0.79722 AT (	-116.90,	-322.40,	401.80,	0.00) DC	NA
	4TH HIGHEST VALUE IS	0.79572 AT (	-72.50,	-345.40,	397.70,	0.00) DC	NA
	5TH HIGHEST VALUE IS	0.77582 AT (	-292.30,	-231.50,	414.20,	0.00) DC	NA
	6TH HIGHEST VALUE IS	0.77556 AT (	-28.20,	-368.40,	395.70,	0.00) DC	NA
BLOWER7	1ST HIGHEST VALUE IS	0.60431 AT (	16.20,	-391.40,	392.00,	0.00) DC	NA
	2ND HIGHEST VALUE IS	0.59744 AT (	0.00,	-450.00,	390.90,	0.00) DC	NA
	3RD HIGHEST VALUE IS	0.59484 AT (	0.00,	-400.00,	392.30,	0.00) DC	NA
	4TH HIGHEST VALUE IS	0.56243 AT (	-50.00,	-400.00,	396.00,	0.00) DC	NA
	5TH HIGHEST VALUE IS	0.56100 AT (	0.00,	-500.00,	388.30,	0.00) DC	NA
	6TH HIGHEST VALUE IS	0.54109 AT (	-50.00,	-450.00,	393.20,	0.00) DC	NA

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
BD = BOUNDARY

**MODELOPTs: CONC RURAL ELEV DFAULT

```
*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of            0 Fatal Error Message(s)
A Total of            0 Warning Message(s)
A Total of            1 Informational Message(s)


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
              ***  NONE  ***


   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

Attachment D

Air Dispersion Modeling

Attachment D
Air Dispersion Modeling
Eagle Mountain Landfill and Recycling Center

D.1. Introduction

The following paragraphs describe the approach taken to model the air quality impacts for the proposed Eagle Mountain Landfill and Recycling Center and discuss the results of the analysis.

D.2. Emission Sources Analyzed

Municipal waste will be transported from various sites in southern California by rail via Southern Pacific Railroad's main lines, and by truck via existing roadways. For site access, MRC proposes to utilize (1) Kaiser's 52-mile industrial rail line, connecting the mine with the main line of the Southern Pacific Railroad at Ferrum, California, and (2) the reconstructed Eagle Mountain Road and new extension, connecting the mine with Interstate 10. At ultimate project development, up to 20,000 tons of waste per day will be transported to the site, with 18,000 tons per day being transported by rail and a maximum of 2,000 tons per day by truck.

Emissions generated by operations at the Eagle Mountain site will be associated with a number of activities. These activities will involve both stationary sources, such as the landfill gas flares, and mobile equipment, such as the haul trucks and heavy equipment operated on-site. By emission type, on-site sources can be grouped into three classes: mobile sources, fugitive dust sources, and stationary combustion sources. Mobile sources include on-highway haul trucks, train emissions, off-highway heavy equipment, and vehicle operation at the Eagle Mountain townsite. Fugitive dust sources include short-term construction activities, landfill road use, cover/liner material processing, and solid waste covering. Stationary combustion sources include the landfill gas flares and emergency generators.

Mobile sources will generate "tailpipe" emissions, fugitive dust from unpaved road travel, and cover/liner material handling. Processing of daily/final cover and liner-rock material will produce fugitive particulate emissions as ore tailing or overburden are reclaimed by screening and crushing. As the refuse begins to decompose, gas will be generated by the anaerobic activity in the landfill. The gas will consist primarily of methane and carbon dioxide, with trace concentrations of other substances either produced by the bacterial activity or evaporated from materials disposed of in the landfill. The gas will be collected through a series of vertical extraction wells and will be disposed of by flaring. A detailed discussion of the emissions sources associated with the Proposed Project is included in Part 5.

D.3. Site Description and Climatology

The Eagle Mountain Landfill and Recycling Center will be located at the site of the inactive Kaiser Eagle Mountain open pit iron mine, on the eastern slope of the Eagle Mountains. The northern boundary of the project site is about 1.5 miles south of the Joshua Tree National Park boundary in Riverside County. The surface excavation of iron ore left three large open pits, extensive tailing deposits, and well-developed rail and road access systems on the site. One of the open pits will gradually be filled with refuse, and the terrain in the vicinity of the pit gradually raised, over the lifetime of the project. The small community of Eagle Mountain is located just outside the project boundary, towards the south. Farther south and east, about 9 and 11 miles, respectively, are the towns of Lake Tamarisk (population 350), and Desert Center (population 35) which straddles Interstate 10. Beyond these small communities, the entire area is either sparsely inhabited or devoid of habitation.

The terrain in the vicinity of the site is variable. Broad alluvial plains are bounded by ridges of uplifted Precambrian sediments and intrusive granitic outcroppings. The Eagle Mountains are to the west of the project site. The valley of Eagle Creek establishes the approximate southern boundary of the Eagle Mountain Landfill and Recycling Center. A major ridge line isolates the project from Joshua Tree National Park's Pinto Basin to the north, and smaller ridges separate the project from the town of Desert Center to the southeast. The valley of Eagle Creek opens out, to the east and southeast, to the Chuckwalla Valley. The Coxcomb Mountains lie 8 miles east, across the valley. The Chuckwalla Valley slopes southeast away from the site. Thus, elements of simple and complex terrain can be found in the immediate vicinity of the project. Enclosed as Attachment D-1 is a figure showing the orthographic projections of the Eagle Mountain project site.

D.4. Meteorological Monitoring in the Vicinity of Eagle Mountain

National Weather Service surface meteorological stations are absent in the immediate vicinity of the Eagle Mountain project. However, for about three years, MRC conducted on-site preconstruction meteorological and ambient air quality monitoring to support the modeling impact analysis required for the SCAQMD permit process. The first phase of meteorological monitoring, supervised by Engineering-Science of Pasadena, CA, commenced in April 1990 and ended April 30, 1991. Valid wind-direction data were not available until June 1, 1990, however. The second phase of meteorological monitoring, begun on May 1, 1991, and supervised by MRC, ended on July 13, 1993.

Standard meteorological variables, such as wind speed, wind direction, and temperature, are measured for the Eagle Mountain on-site meteorological data collection effort. Joshua Tree National Park surrounds the Project Site on three sides; the prevailing winds carry pollutants towards the Park approximately 80% of the time. In order to characterize on-site dispersion, data on the standard deviation of wind direction fluctuations in either the vertical (σ_E), or horizontal (sigma theta; σ_θ)

directions have also been collected. Unfortunately, electronic problems prevented sigma theta data gathering until November 1, 1990. Thus, on-site meteorological data gathered from May 1, 1990, until November 1, 1990 (and during sporadic but brief intervals since then), do not include measurements of sigma theta.

D.5. Meteorological Data Base

For the air quality impact analysis, stability class was generally determined using the standard sigma theta procedure (described in Attachment D-2) for meteorological data collected onsite. At times, however, Turner's (1964) stability classification procedure, based in part on cloud cover data from representative surface meteorological stations within 110 km of the project site (i.e., Palm Springs airport, 29 Palms U.S.M.C. base, Norton AFB) was used to characterize stability (also described in Attachment D-2). Enough site specific meteorological data were collected to create a 365-day composite meteorological data set for the modeling effort based almost entirely on the sigma theta stability classification. In order to complete the composite meteorological data set, it was necessary to substitute August data for missing June data. In addition, a second meteorological data set was created that substituted data from a much closer period of time for missing June data. This second data set used the Turner's (1964) stability classification procedure to estimate stability class for the missing June data rather than the site-specific sigma theta procedure. Based on consultation with SCAQMD and NPS staff, modeling was done with data set number 2 (named SET2).

A summary of the available meteorological data, and degree of completeness, is shown in Attachment D-3. For each day of the year during 1990, 1991 and 1992, the degree of completeness is indicated. Also shown for each Julian day is the year from which data were used for the composite 365-day meteorological data base. Proposed data substitutions for those Julian days when data are not available for 1990-1992 are also listed. These proposed data substitutions have been developed based on the following hierarchy of concerns (in order of importance):

- For proper implementation of the modified RAMMET procedure, data should be in contiguous 24-hour blocks.
- For accurate modeling of annual climatological cycles, substitute days should be as close as possible in the annual cycle to missing days.
- No data are to be repeated.
- Days for which one or another of missing variables might have to be interpolated should have no more than three hours of missing variables.
- Blocks of substituted days should be contiguous in time.
- Given a choice, more recent data are preferred over older data.

All data contained in the proposed composite data base are in real 24-hour blocks, in order to permit proper interpolation of mixing heights (using the RAMMET procedure for models such as ISCST2, RTDM, or FDM, and the METPRO procedure for SHORTZ). Discontinuities in the origin year of the data should cause little problem

with mixing height determination, provided the data come from approximately the same time of the year. None of the proposed dates for inclusion in the composite data base have more than three contiguous hours when interpolation might be required to account for missing data. When required, linear interpolation from bracketing data was used to substitute for 1-3 hours of missing temperature and sigma theta fields; missing wind directions remained the same as in the last available hour, and missing wind speeds were conservatively replaced with 1.0 mph (which is replaced later by the modified RAMMET procedure with 1.0 m/s).

There are three periods of time (Julian days) in the composite year when no data are available from 1990-1992, and data were substituted from other nearby Julian days:

- Julian days 26 - 28 (January 26 -28): 3 days
- Julian days 123 - 127 (May 3 - May 7): 5 days
- Julian days 144 - 167 (May 23 - June 16): 24 days

Of these periods, the most serious is the 24-day gap (6.5% of the year) in early summer. As mentioned before, two alternative substitution algorithms were used to address this gap.

Under the first substitution algorithm, a block substitution from Julian days 222 - 246 (August 10 - September 3, 1991) was used for this gap. As pointed out during discussions with the South Coast AQMD District staff, there is some reason to believe that there is a climatological difference between early and late summer in the deserts of southeast California (monsoonal flow from the SE in the late summer). The inclusion of almost two months of August data in the new composite data set might tend to bias the data somewhat towards a southeast wind regime, typical of that found late in the summer, rather than the more typical west and northwest wind regime. This bias was expected to be small, however.

In order to evaluate the potential effect of this bias, a second substitution algorithm used 1990 meteorological data for Julian days 152-175 (May 31 - June 23) to represent Julian days 144-167 (May 23 - June 16) in the composite data set. For these days, the modified Turner (1964) procedure for calculation of stability classification was used since sigma theta was not measured during those days in 1990.

The use of two alternative data substitution algorithms helped ensure that any potential bias associated with either method was identified. The effect of block substitutions was minor.

A review of EPA On-Site Meteorological Program Guidance* indicates that EPA has recently clarified its definition of "daytime" and "nighttime" for the purpose of stability classification determination. In addition, EPA has also extended its

---

* Footnote to Table 6-8b, page 6-30, On-Site Meteorological Program Guidance for Regulatory Modeling Applications, EPA-450/4-87-013, revised August 1995.

recommendation that hour-to-hour changes in Pasquill-Gifford stability classes not exceed one category per hour for stability classes determined from on-site met data using methods other than the Turner (1964) method, such as various sigma theta methods. The Eagle Mountain Set 2 stability classifications have been updated in order to remain in compliance with EPA on-site met data recommendations.

D.6. Choice of Models

Both simple and complex terrain modeling were needed to investigate potential air quality impacts from the Proposed Project, due to the variability of terrain in the vicinity of the project. A number of EPA-approved air quality dispersion models are available to conduct analyses for both the simple and complex terrain surrounding the Eagle Mountain project site. The most important considerations for model choice are complex terrain and the nature of project sources. To meet the requirements for a model to analyze point, area, and volume source impacts in simple and complex terrain, the ISCST3 model was used to analyze the ambient impacts for the Proposed Project.

ISCST3 is the EPA's recommended model for point, area, and volume sources in simple and complex terrain. ISCST3 is a steady-state Gaussian air quality model that can predict inert pollutant concentrations from multiple point, area or volume sources. The short term (ST) version of the model requires hourly meteorological data and computes average pollutant concentrations for hourly, annual, and other averaging periods.

D.7. Program Control Parameters

Program control parameters refer to a number of model options that can be employed for a particular application. These options include the use of site-specific vertical profiles of wind speed and temperature, stack and building wake effects, and time dependent exponential decay of pollutants. The model supplies recommended default parameters for those options that are not selected by the user. Except where explicitly stated, default values were used.

The dispersion calculations in the Eagle Mountain project air quality impact analysis were run using the parameter settings currently recommended by the EPA. These include stack downwash effects, buoyancy induced dispersion for heated effluents, exclusion of calm meteorological conditions (wind speeds of less than one meter per second) from the dispersion calculations, and use of the default options selected when the "regulatory option" parameter is chosen. Deposition of PM_{10} was generally ignored, except for refined analyses of project impacts on JTNP, and for the regional haze analysis.

D.8. Receptor Grid

ISCST3 allows the user to define both gridded arrays of modeling receptors and sets of "discrete" receptors. Discrete receptors were used in this analysis to capture plume impacts on surrounding terrain. A coarse grid of discrete receptors was used that extends from the project boundary outward approximately 1 km with receptor spacing of 300 meters. There were also receptors placed along the boundary of project with receptor spacing of 300 meters and less.

A fine grid of receptors was used at specific locations on the southern and southwestern sides of the project boundary, where coarse-grid modeling indicated high project ambient impacts. Elevations for the coarse and fine grid receptors were derived from a U.S. Geological Survey Digital Elevation Model (DEM) tape for the area. Elevations from this DEM tape were found to be reliable except in the immediate area of the project (the elevation data were measured by topographic surveys before the iron ore mine was developed). Nevertheless, the DEM elevation data were used to specify source elevations within the project boundary since it is anticipated that the open mine pits will be filled to approximately the original elevations during the course of the project. Figure D-1, shows the location of the receptors along the project boundary, the fine receptor grids, and a portion of the coarse receptor grid.

D.9. Source Data

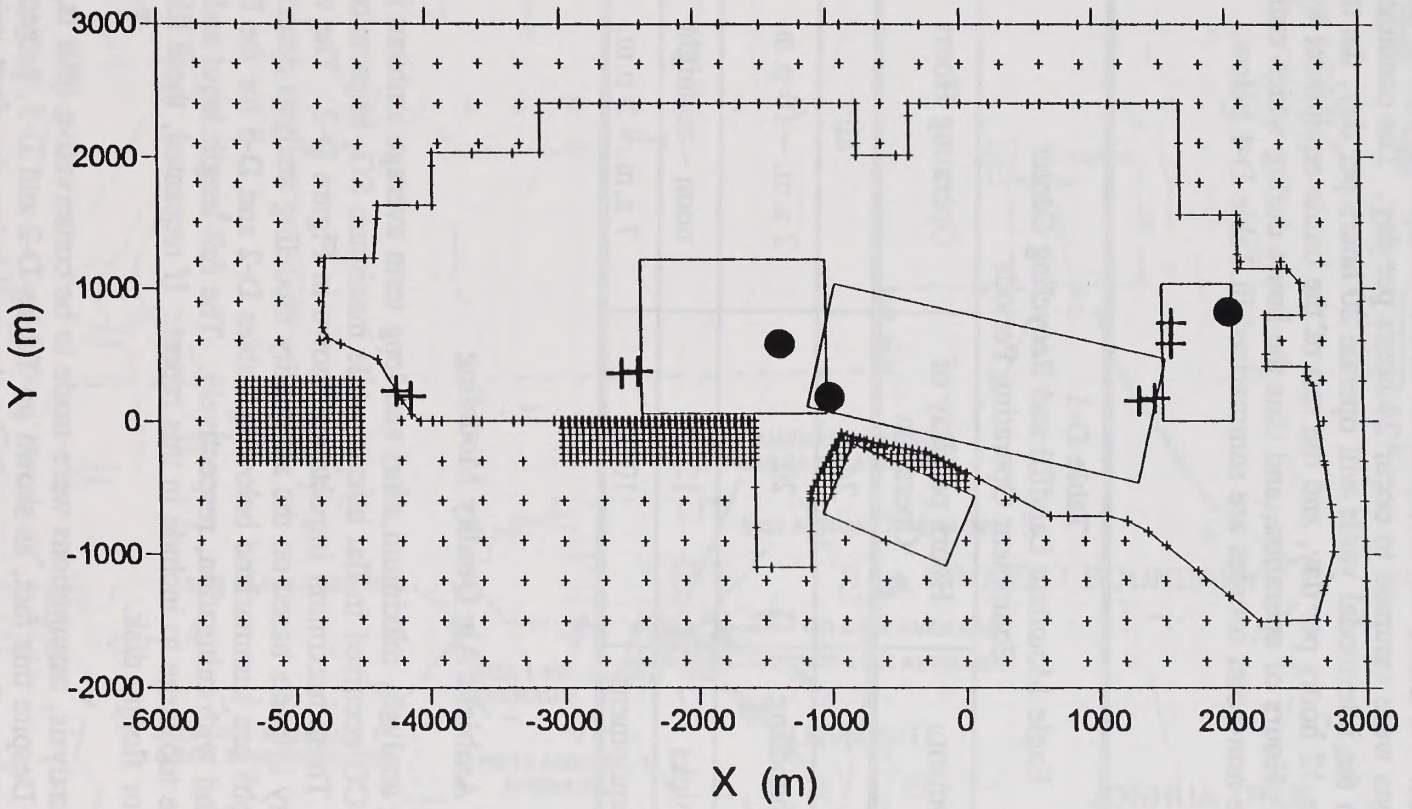
ISCST3 requires the user to specify the type of emission source (i.e., point or area source) to be modeled. For this analysis, the landfill gas flares, liner/cover processing, and emergency generators were modeled as point sources. Other project sources, which include mobile equipment, vehicle and rail combustion sources and fugitive dust from equipment operation, were modeled as area sources. The project site was divided into four areas that best described where the pollutant-emitting activities took place (i.e., three area sources within the landfill boundary and a separate area source to represent the Eagle Mountain Townsite). Figure D-1 shows the various point and area sources analyzed.

In addition to describing the type of emission source, ISCST3 also allows the user to define source characteristics such as emission release heights and dispersion coefficients. For this analysis, the landfill gas flares, liner/cover processing, and emergency generators were modeled with an initial release height of 22.9, 5, and 3 meters, respectively, based on the expected stack heights for these point sources. The area source combustion emissions were modeled with an initial release height of 5 meters and an initial σ_z (dispersion coefficient in the vertical) of 2.33 meters. This initial release height was selected using the EPA SCREEN3 model to determine final plume rise of the exhaust from the mobile equipment. The value for σ_z was calculated, based on EPA guidance*, as the initial release height divided by 2.15.

---

* EPA's "Draft User's Guide For The Industrial Source Complex (ISC3) Dispersion Models (Revised), Volume II - Description Of Model Algorithms", EPA-454/B-95-003b, July 1995, Table 1-6.

Figure D-1
Eagle Mountain Landfill and Recycling Center
Receptor Grids and Emission Source Locations



LEGEND

- Liner / Cover Processing Plant and Emergency Generators
- Flares
- Coarse Receptor Grid
- Fine Receptor Grid

The initial release height for the area source fugitive dust emissions was 3 meters; σ_z was calculated similarly to be 1.40 meters. While the landfill gas flares will operate at a constant level throughout the day, the onsite mobile equipment will operate over shorter periods during the day. Both combustion and fugitive dust emissions from the area sources were allocated to hours of the day based on the expected equipment operating schedules. As trains can arrive at the intermodal yards any hour of the day, onsite rail emissions were assumed to occur 24 hours per day. The container handling cranes in the intermodal yards will operate 20 hours per day, the transfer trucks will operate 12 hours per day, and the rest of the onsite equipment will operate 10 hours per day. Hours of operation, and thus the hours during which emissions will occur, for the non-point sources are summarized in Table D-1 below.

Table D-1
Eagle Mountain Landfill and Recycling Center
Equipment Operating Periods

Equipment	Hours per Day of Operation	Operating Hours
Rail	24	all
Container handling cranes	20	2 a.m. - 10 p.m.
Transfer trucks	12	noon - midnight
All other equipment	10	7 a.m. - 5 p.m.

D.10. Results of Ambient Air Quality Modeling

For the modeling analysis, maximum short and long term average ambient impacts for NO_2, PM_{10}, and CO occurred in flat terrain while maximum SO_2 impacts occurred in elevated terrain. These maximum impacts are shown in Figure D-2. The worst-case ambient air quality impacts based on the air quality modeling analysis described in the previous paragraphs are summarized below in Tables D-2 and D-3 for the Proposed Project without and with mitigation, respectively. The full length input and output modeling files are too large to include in this report. If requested, these files will be supplied on tape or floppy disk.

Throughout the analysis, assumptions were made to be conservative (that is, overpredictive). Despite this fact, as shown on Tables D-2 and D-3, project impacts alone for all modeled pollutants are expected to be well below the most stringent state and national air quality standards for both the Proposed Project with and without

Figure D-2
Eagle Mountain Landfill and Recycling Center
Maximum Project Impacts

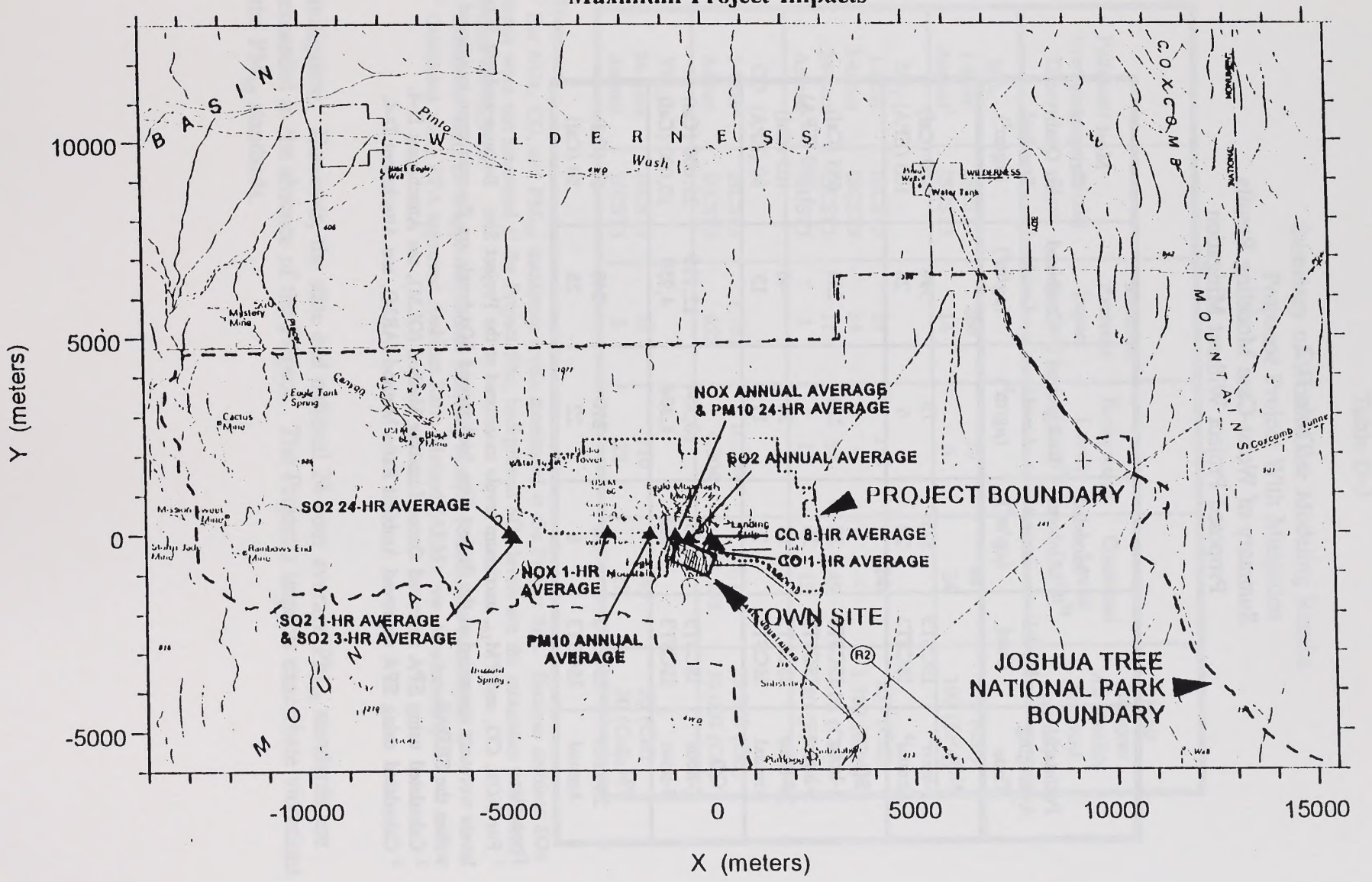


Table D-2

Summary of Worst-Case Modeling Results
Proposed Project Without Mitigation

Pollutant/ Averaging Time	Model Used	Modeled Ambient Impact ($\mu g/m^3$)	Background Levels[1] ($\mu g/m^3$)	Combined Levels ($\mu g/m^3$)	Most Stringent Air Quality Standard ($\mu g/m^3$)
NO_2					
1-hour[2]	ISCST3	323	75	398	470 (Cal)
Annual[3]	ISCST3	22	6	28	100 (EPA)
SO_2					
1-hour	ISCST3	38	213	251	655 (Cal)
3-hour	ISCST3	36	-	-	1,300 (EPA)
24-hour	ISCST3	12	34	46	105 (Cal)
Annual	ISCST3	2	11	13	80 (EPA)
CO					
1-hour	ISCST3	1,761	10,354	12,115	23,000 (Cal)
8-hour	ISCST3	655	4,304	4,959	10,000 (Cal)
PM_{10}					
24-hour	ISCST3	38	210	248	50 (Cal)
Annual	ISCST3	6	22	28	30 (Cal)

Footnote:
[1] For NOx, CO, and PM_{10}, maximum levels monitored at the Project Site. Because ambient SOx levels were not measured at the Project Site, background SOx levels are the maximum monitored within the SEDAB.
[2] Calculated using EPA approved Ozone Limiting Method (OLM), see Attachment D-4.
[3] Calculated using EPA approved Ambient Ratio Method (ARM), see Attachment D-4.

Table D-3

Summary of Worst-Case Modeling Results
Proposed Project With Mitigation

Pollutant/ Averaging Time	Model Used	Modeled Ambient Impact ($\mu g/m^3$)	Background Levels[1] ($\mu g/m^3$)	Combined Levels ($\mu g/m^3$)	Most Stringent Air Quality Standard ($\mu g/m^3$)
NO_2					
1-hour[2]	ISCST3	266	75	441	470 (Cal)
Annual[3]	ISCST3	14	6	24	100 (EPA)
SO_2					
1-hour	ISCST3	35	213	248	655 (Cal)
3-hours	ISCST3	34	-	-	1,300 (EPA)
24-hour	ISCST3	11	34	45	105 (Cal)
Annual	ISCST3	1	11	12	80 (EPA)
CO					
1-hour	ISCST3	1,761	10,354	12,115	23,000 (Cal)
8-hour	ISCST3	655	4,304	4,959	10,000 (Cal)
PM_{10}					
24-hour	ISCST3	35	210	245	50 (Cal)
Annual	ISCST3	5	22	27	30 (Cal)

Footnote:
[1] For NOx, CO, and PM_{10}, maximum levels monitored at the Project Site. Because ambient SOx levels were not measured at the Project Site, background SOx levels are the maximum monitored within the SEDAB.
[2] Calculated using EPA approved Ozone Limiting Method (OLM), see Attachment D-4.
[3] Calculated using EPA approved Ambient Ratio Method (ARM), see Attachment D-4.

mitigation. However, the state and national 24-hour average PM_{10} standards are exceeded in the absence of the Project. The Project's impacts exacerbate violations of the PM_{10} standards.

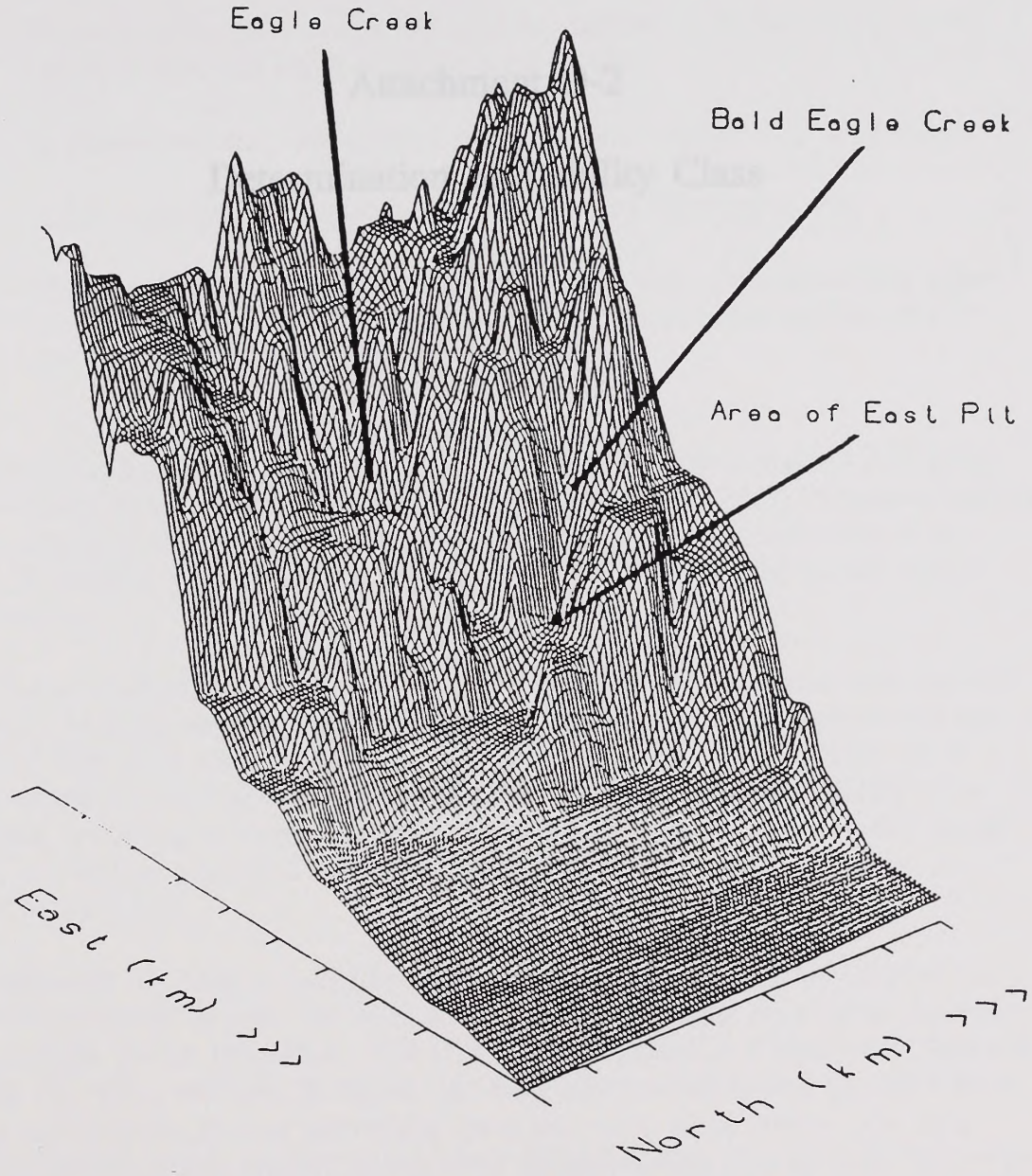
Attachment D-1

Topography of Eagle Mountain Project

Figure D-1-1 - Orthographic projection of the Digital Elevation Model (DEM) topographic data, for the Eagle Mountain area. These data were used to determine receptor elevations for modeling purposes.

Figure D-1-1

Orthographic Projection of
Eagle Mountain Project Area



Attachment D-2

Determination of Stability Class

Determination of Stability Class

In order to characterize dispersion during those intervals when sigma theta is not measured, it is necessary to have an alternative scheme to infer the degree of turbulence (and resultant Pasquill-Gifford stability class for the purpose of modeling). There are four standard methods accepted by EPA for determining stability class (listed in order of preference):

- Turner's 1964 method using site-specific data which include cloud cover, ceiling height, and surface (10 m) wind speed;
- σ_E determined from site-specific measurements, modified by wind speed;
- σ_θ from site-specific measurements modified by wind speed; or
- Modified Turner's 1964 method, using site-specific wind speed with cloud cover and ceiling height from a nearby National Weather Service (NWS) site.

The proposed procedure for analyzing the on-site MRC meteorological data is the third method listed above, using the site-specific sigma theta data. However, during those periods when sigma theta data were not collected (particularly from June 1, 1990, to October 30, 1990), it is necessary to use a variant of the fourth method listed above.

The Turner method determines Pasquill-Gifford stability classes from data that are routinely collected at NWS sites. The method estimates the effects of net radiation on stability from solar altitude, total cloud cover, and ceiling height. Cloud cover observations are used in conjunction with wind speed to determine stability class. For example, according to Turner's scheme for determining stability class, 40% cloud cover is a critical point in differentiating between classes at night, as shown in Table D-2-1 below.

One difficulty has been to establish which NWS site is best suited by location and observation period to yield the cloud cover and ceiling height required to implement the modified Turner procedure. The U.S.M.C. air station at Twenty-Nine Palms is closest (45 miles) to Eagle Mountain, but these observations have a sporadic nature, being available for 24-hour intervals at times and not at all at others. The Palm Springs airport is only slightly farther away (60 miles) than Twenty-Nine Palms, and the data are less sporadic, but they are not available for nighttime hours. Other NWS stations in the area, such as Blythe and Daggett, suffer the same nighttime data deficiency as Palm Springs. Thus, there is a need to rely at times on one or several 24-hour NWS stations, despite the deficiency of using cloud cover data from an NWS station not located in the general area of Eagle Mountain.

Table D-2-1
Nighttime Stability Class as a Function of Wind Speed and Cloud Cover

Wind Speed (meters/sec)	Cloud Cover (%)	Stability Class
Less than 1.9	Any	6
1.9-3.3	$\leq$ 40% (clear)	6
1.9-3.3	> 40% (cloudy)	5
3.4-5.4	$\leq$ 40% (clear)	5
3.4-5.4	> 40% (cloudy)	4
Greater than 5.4	Any	4

Norton Air Force Base (NAFB) in San Bernardino (102 miles from Eagle Mountain) was used as the backup station for those times when appropriate data from Twenty-Nine Palms or Palm Springs are unavailable (particularly nighttime). There are no other 24-hour NWS stations closer to Eagle Mountain than Norton AFB. (George AFB, near Victorville, was considered as well, because its high-desert climate should be closer than Norton AFB's climate to Eagle Mountain's low-desert climate, but it is even farther away than Norton AFB from Eagle Mountain (120 miles).)

Nighttime cloud cover, particularly at an arid site like Eagle Mountain, is less likely to be influenced by local storms than it is by mesoscale or synoptic-scale weather systems. On an hour-by-hour basis, these (often fast-moving) systems should affect cloud cover at Eagle Mountain and Norton AFB at roughly similar times, and in roughly similar amounts. Norton AFB cloud cover observations are satisfactory for estimating cloud cover even at a somewhat distant site such as Eagle Mountain, provided no other cloud cover observations are available. Together, these three sets of data (Palm Springs, Twenty-Nine Palms, and Norton AFB) contain enough resources to properly estimate stability classes and to assemble a one-year meteorological data base for the purpose of modeling at the Eagle Mountain site.

The general cloud cover data protocol is presented below. Cloud cover and ceiling height were chosen preferentially from these stations in the following order, as available:

- Twenty-Nine Palms U.S.M.C. Air Station
- Palm Springs Municipal Airport

- Norton Air Force Base in San Bernardino

For all stations, total sky cover, rather than total opaque sky cover, is used as the latter is not measured at Norton AFB. Occasionally after November 1, 1990, particularly over several days in December 1990 and January 1991, site-specific sigma theta data collection was interrupted. For those time periods, the modified Turner procedure was used in order to establish stability class.

There is no standard procedure for processing on-site met data into model-ready format. The procedure that was followed was to modify the program RAMMET, which is used to process standard NWS data into model-ready format, into a form that can process on-site data as well. The continuity checks embedded in the original RAMMET program have been disabled, permitting stability class to be determined for discontinuous periods (albeit in 24-hour blocks). Stability class determination follows the two procedures discussed earlier.

Finally, mixing heights for the modeling were determined in the standard way by using the graphs and tables generated by Holzworth (1972).

As mentioned in Section D.5, a review of EPA On-Site Meteorological Program Guidance* indicates that EPA has recently clarified its definition of "daytime" and "nighttime" for the purpose of stability classification determination. In addition, EPA has also extended its recommendation that hour-to-hour changes in Pasquill-Gifford stability classes not exceed one category per hour for stability classes determined from on-site met data using methods other than the Turner (1964) method, such as various sigma theta methods. For the purpose of these modeling analyses, Eagle Mountain Set 2 stability classifications have been updated in order to remain in compliance with EPA on-site met data recommendations.

---

* Footnote to Table 6-8b, page 6-30, On-Site Meteorological Program Guidance for Regulatory Modeling Applications, EPA-450/4-87-013, revised August 1995.

Attachment D-3

Summary Of Meteorological Data

Eagle Mountain Meteorological Data Set (1990-1992)

For each date in the year indicated, of the four measured variables (wind direction and speed, temperature, and sigma theta), those variables that are missing from the Eagle Mountain meteorological data set are identified. A blank indicates that no data are available for that day.

X : all data available
ST: sigma theta data only missing
3: number of hours with one or more variables missing (e.g., 3)

Julian Day	1990	1991	1992	Data Used for	
				Set 1	Set 2
1		X	X	1992	1992
2		X	X	1992	1992
3		4	X	1992	1992
4		X	X	1992	1992
9		X	X	1992	1992
4		X	X	1992	1992
8		X	X	1992	1992
8		X	X	1992	1992
9		X	X	1992	1992
10		X	X	1992	1992
10		X	X	1992	1992
10		X	X	1992	1992
10		X	X	1992	1992
14		X	X	1992	1992
10		X	X	1992	1992
16		X	X	1992	1992
17		X	5	1991	1991

Julian Day	1990	1991	1992	Data Used for	
				Set 1	Set 2
18		X		1991	1991
19		X		1991	1991
20		X	23	1991	1991
21		X		1991	1991
22		X		1991	1991
23		X		1991	1991
24		X		1991	1991
25		X		1991	1991
26				JD32,1991	JD32,1991
27				JD33,1991	JD33,1991
27		17		JD33,1991	JD34,1991
29		X	16	1991	1991
30		X	X	1992	1992
31		20	X	1992	1992
32		X	X	1992	1992
33		X	X	1992	1992
34		X	X	1992	1992
35		X	X	1992	1992
36		X	X	1992	1992
37		X	X	1992	1992
38		X	X	1992	1992
39		X	X	1992	1992
40		X	X	1992	1992
41		X	X	1992	1992
42		X	X	1992	1992
43		X	X	1992	1992
44		X	X	1992	1992

Julian Day	1990	1991	1992	Data Used for	
				Set 1	Set 2
45		X	X	1992	1992
46		X	X	1992	1992
47		X	X	1992	1992
48		X	X	1992	1992
49		X	X	1992	1992
50		X	X	1992	1992
51		X	X	1992	1992
52		X	X	1992	1992
53		X	X	1992	1992
54		X	X	1992	1992
55		X	X	1992	1992
56		X	X	1992	1992
57		X	X	1992	1992
58.00		X	X	1992	1992
59.00		X	X	1992	1992
60.00		X	X	1992	1992
61.00		X	X	1992	1992
62.00		X	X	1992	1992
63.00		X	X	1992	1992
64.00		X	16	1991	1991
65.00		X	X	1992	1992
66.00		X	X	1992	1992
67.00		X	X	1992	1992
68.00		X	X	1992	1992
69.00		X	X	1992	1992
70.00		X	X	1992	1992
71.00		X	X	1992	1992

Julian Day	1990	1991	1992	Data Used for	
				Set 1	Set 2
72.00		X	X	1992	1992
73.00		X	X	1992	1992
74.00		X	X	1992	1992
79.00		X	X	1992	1992
76.00		X	X	1992	1992
77.00		X	X	1992	1992
78.00		X	X	1992	1992
79.00		X	X	1992	1992
80.00		X	X	1992	1992
80.00		X	X	1992	1992
82.00		X	X	1992	1992
80.00		X	X	1992	1992
83.00		X	X	1992	1992
85.00		X	X	1992	1992
86.00		X	X	1992	1992
87.00		X	X	1992	1992
88.00		X	X	1992	1992
89.00		X	X	1992	1992
80.00		X	X	1992	1992
91.00		X	X	1992	1992
92.00		X	X	1992	1992
93.00		X	X	1992	1992
94.00		X	X	1992	1992
95.00		X	X	1992	1992
96.00		X	X	1992	1992
97.00		X	X	1992	1992
98.00		X	X	1992	1992

Julian Day	1990	1991	1992	Data Used for	
				Set 1	Set 2
99.00		X	X	1992	1992
100.00		X	22	1991	1991
101.00		X		1991	1991
102.00		X		1991	1991
103.00		X		1991	1991
104.00		X		1991	1991
105.00		X		1991	1991
106.00		X		1991	1991
107.00		X		1991	1991
108.00		X		1991	1991
109.00		X		1991	1991
110.00		X		1991	1991
111.00		X		1991	1991
112.00		X		1991	1991
113.00		X		1991	1991
114.00		X		1991	1991
115.00		X		1991	1991
116.00		X		1991	1991
117.00		X		1991	1991
118.00		X		1991	1991
119.00		X		1991	1991
120.00		X		1991	1991
121.00		X		1991	1991
122.00		X		1991	1991
124.00		17		JD95,1991	JD95,1991
124.00				JD96,1991	JD96,1991
125.00				JD97,1991	JD97,1991

Julian Day	1990	1991	1992	Data Used for	
				Set 1	Set 2
126.00				JD98,1991	JD98,1991
127.00		X		JD99,1991	JD99,1991
126.00		X		1991	1991
129.00		X		1991	1991
130.00		X		1991	1991
141.00		X		1991	1991
132.00		X		1991	1991
133.00		X		1991	1991
133.00		X		1991	1991
135.00		X		1991	1991
136.00		X		1991	1991
137.00		X		1991	1991
136.00		X		1991	1991
139.00		X		1991	1991
142.00		X		1991	1991
141.00		X		1991	1991
142.00		X		1991	1991
133.00		X		1991	1991
144.00		23		JD222,1991	JD152,1990
145.00				JD223,1991	JD153,1990
146.00				JD224,1991	JD154,1990
147.00				JD225,1991	JD155,1990
147.00				JD226,1991	JD156,1990
146.00				JD227,1991	JD157,1990
150.00				JD228,1991	JD158,1990
151.00				JD229,1991	JD159,1990
152.00	ST			JD230,1991	JD160,1990

Julian Day	1990	1991	1992	Data Used for	
				Set 1	Set 2
154.00	ST			JD231,1991	JD161,1990
154.00	ST			JD232,1991	JD162,1990
155.00	ST			JD233,1991	JD163,1990
156.00	ST			JD234,1991	JD164,1990
157.00	ST			JD235,1991	JD165,1990
158.00	ST			JD236,1991	JD166,1990
159.00	ST			JD237,1991	JD167,1990
160.00	ST			JD238,1991	JD168,1990
161.00	ST			JD239,1991	JD169,1990
162.00	ST			JD240,1991	JD170,1990
163.00	ST			JD241,1991	JD171,1990
164.00	ST			JD242,1991	JD172,1990
165.00	ST			JD243,1991	JD174,1990
166.00	ST			JD245,1991	JD174,1990
167.00	ST		18	JD246,1991	JD175,1990
168.00	ST		X	1992	1992
169.00	ST		X	1992	1992
170.00	ST		X	1992	1992
171.00	ST		X	1992	1992
170.00	ST		X	1992	1992
173.00	ST			1992	1992
173.00	ST		X	1992	1992
175.00	ST		X	1992	1992
176.00	ST		X	1992	1992
177.00	ST		X	1992	1992
178.00	ST		X	1992	1992
179.00	ST		X	1992	1992

Julian Day	1990	1991	1992	Data Used for	
				Set 1	Set 2
180.00	ST		X	1992	1992
181.00	ST		X	1992	1992
182.00	ST		X	1992	1992
184.00	ST		X	1992	1992
184.00	ST		X	1992	1992
185.00	ST		X	1992	1992
184.00	ST		X	1992	1992
187.00	ST		X	1992	1992
188.00	ST		X	1992	1992
189.00	ST		X	1992	1992
190.00	ST		X	1992	1992
191.00	ST		X	1992	1992
192.00	ST		X	1992	1992
193.00	ST		X	1992	1992
194.00	ST		X	1992	1992
195.00	ST		X	1992	1992
196.00	ST		X	1992	1992
197.00	ST		X	1992	1992
198.00	ST		1	1992	1992
199.00	ST		X	1992	1992
200.00	ST		X	1992	1992
201.00	ST		X	1992	1992
202.00	ST		X	1992	1992
203.00	ST		X	1992	1992
204.00	ST		X	1992	1992
205.00	ST		X	1992	1992
206.00	ST		X	1992	1992

Julian Day	1990	1991	1992	Data Used for	
				Set 1	Set 2
207.00	ST		X	1992	1992
208.00	ST		X	1992	1992
209.00	ST		X	1992	1992
212.00	ST		X	1992	1992
214.00	ST		X	1992	1992
212.00	ST		X	1992	1992
213.00	ST		X	1992	1992
214.00	ST		X	1992	1992
215.00	ST		X	1992	1992
216.00	ST		X	1992	1992
217.00	ST		X	1992	1992
218.00	ST		X	1992	1992
219.00	ST		X	1992	1992
220.00	ST		X	1992	1992
221.00	12	11	X	1992	1992
222.00	ST	X	X	1992	1992
223.00	ST	X	1	1992	1992
224.00	7	X	X	1992	1992
225.00	7	X	X	1992	1992
226.00	ST	X	X	1992	1992
227.00	ST	X	X	1992	1992
228.00	12	X	X	1992	1992
229.00	ST	X	X	1992	1992
230.00	ST	X	X	1992	1992
231.00	ST	X	X	1992	1992
232.00	ST	X	X	1992	1992
233.00	ST	X	X	1992	1992

Julian Day	1990	1991	1992	Data Used for	
				Set 1	Set 2
234.00	ST	X	1	1992	1992
239.00	ST	X	X	1992	1992
236.00	ST	X	X	1992	1992
237.00	ST	X	X	1992	1992
238.00	ST	X	X	1992	1992
239.00	ST	X	X	1992	1992
240.00	3	X	X	1992	1992
241.00	ST	X	X	1992	1992
242.00	ST	X	X	1992	1992
248.00	ST	X	X	1992	1992
244.00	ST		X	1992	1992
245.00	ST	X	X	1992	1992
246.00	ST	X	X	1992	1992
248.00	ST	X	X	1992	1992
248.00	ST	3	X	1992	1992
249.00	ST	3	X	1992	1992
250.00	ST	X	X	1992	1992
251.00	ST	X	X	1992	1992
252.00	ST	X	X	1992	1992
253.00	ST	X	X	1992	1992
254.00	ST	X	X	1992	1992
255.00	ST	X	X	1992	1992
254.00	ST	X	X	1992	1992
257.00	ST	X	X	1992	1992
258.00	ST	X	X	1992	1992
259.00	ST	X	X	1992	1992
260.00	ST	X	X	1992	1992

Julian Day	1990	1991	1992	Data Used for	
				Set 1	Set 2
261.00	ST	X	X	1992	1992
262.00	ST	X	2	1992	1992
263.00	ST	X	X	1992	1992
264.00	ST	X	X	1992	1992
265.00	ST	X	X	1992	1992
266.00	ST	X	X	1992	1992
267.00	ST	X	X	1992	1992
268.00	ST	X	X	1992	1992
269.00	ST	X	X	1992	1992
270.00	9	X	X	1992	1992
270.00	7	X	X	1992	1992
272.00	ST	X	X	1992	1992
273.00	ST	X	X	1992	1992
274.00	ST	X	X	1992	1992
279.00	ST	X	X	1992	1992
276.00	ST	X	X	1992	1992
277.00	ST	X	X	1992	1992
278.00	ST	X	X	1992	1992
279.00	ST	X	X	1992	1992
280.00	ST	X	X	1992	1992
281.00	ST	X	X	1992	1992
282.00	ST	X	X	1992	1992
284.00	ST	X	X	1992	1992
284.00	ST	5	X	1992	1992
285.00	ST	X	X	1992	1992
286.00	ST	X	X	1992	1992
287.00	ST	X	X	1992	1992

Julian Day	1990	1991	1992	Data Used for	
				Set 1	Set 2
288.00	ST	X	X	1992	1992
289.00	ST	X	X	1992	1992
290.00	ST	X	X	1992	1992
291.00	ST	X	X	1992	1992
292.00	ST	X	X	1992	1992
293.00	ST	X	X	1992	1992
294.00	ST	X	X	1992	1992
295.00	ST	3	X	1992	1992
296.00	ST	6	X	1992	1992
297.00	ST	X	X	1992	1992
298.00	ST	X	X	1992	1992
299.00	ST	X	X	1992	1992
300.00	ST	X	X	1992	1992
301.00	ST	X	X	1992	1992
302.00	ST	X	X	1992	1992
303.00	ST	X	X	1992	1992
304.00	ST	X	X	1992	1992
305.00	X	11	X	1992	1992
306.00	X		X	1992	1992
307.00	X	11	X	1992	1992
308.00	X	X	X	1992	1992
309.00	X	X		1991	1991
310.00	X	1		1991	1991
311.00	X	X		1991	1991
312.00	X	X		1991	1991
313.00	X	X		1991	1991
314.00	X	X		1991	1991

Julian Day	1990	1991	1992	Data Used for	
				Set 1	Set 2
315.00	X	X		1991	1991
316.00	X	X		1991	1991
317.00	X	X		1991	1991
318.00	X	X		1991	1991
319.00	X	X		1991	1991
320.00	X	X		1991	1991
321.00	X	X		1991	1991
322.00	X	X		1991	1991
323.00	X	X		1991	1991
324.00	X	X		1991	1991
325.00	X	X		1991	1991
326.00	X	X		1991	1991
327.00	X	X		1991	1991
328.00	X	X		1991	1991
329.00	X	X		1991	1991
330.00	X	X		1991	1991
331.00	X	X		1991	1991
332.00	X	X		1991	1991
333.00	X	X		1991	1991
333.00	X	X		1991	1991
335.00	X	X		1991	1991
336.00	X	X		1991	1991
337.00	X	X		1991	1991
338.00	X	1		1991	1991
339.00	X	X		1991	1991
340.00	X	X		1991	1991
341.00	X	22		1990	1990

Julian Day	1990	1991	1992	Data Used for	
				Set 1	Set 2
342.00	X			1991	1990
343.00	X			1991	1990
344.00	X			1991	1990
345.00	X	10		1990	1990
346.00	X	X		1991	1991
347.00	X	X		1991	1991
349.00	6	X		1991	1991
349.00	X	X		1991	1991
350.00	X	X		1991	1991
351.00	X	X		1991	1991
358.00	X	X		1991	1991
353.00	10	X		1991	1991
354.00		X		1991	1991
355.00		X		1991	1991
356.00		X		1991	1991
357.00		X		1991	1991
358.00		X		1991	1991
359.00		X		1991	1991
360.00	8	X		1991	1991
361.00	X	X		1991	1991
362.00	7	X		1991	1991
363.00	8	X		1991	1991
364.00	2	X		1991	1991
365.00	10	X		1991	1991
Number of days in composite year from 1990				8	32
Number of days in composite year from 1991				146	122
Number of days in composite year from 1992				211	211

Attachment D-4

Ozone Limiting/Ambient Ratio Methods

Ozone Limiting/Ambient Ratio Methods

For the air quality modeling analysis performed for the Proposed Project, the one-hour and annual average concentrations of NO_2 have been computed following the revised guidance for computing these concentrations in the August 9, 1995 *Federal Register* (60 FR 40465). Two separate cases are considered for the Proposed Project, without and with mitigation. For both cases the one-hour average concentration is computed by the ozone limiting method (OLM) using the onsite monitored one-hour maximum ozone concentration of 0.12 ppm. The annual average concentrations are calculated using the ambient ratio method (ARM) with the national default value of 0.75 for the annual average NO_2/NOx ratio.

Sample calculation, the without-mitigation case - The modeling results for this case show a maximum one-hour average NOx concentration of 980.6 $\mu g/m^3$ (as NO_2). This is equivalent to a concentration of 0.52 ppm. Ambient onsite monitoring data shows that the maximum one-hour average ozone concentration is 0.12 ppm. (This ozone concentration is less than 90% of the maximum NOx concentration 0.47 ppm). For this case the OLM assumes that the ozone can immediately convert an equivalent ppm of NO to NO_2, and an additional 10% of the NOx is directly emitted as NO_2 or converted from NO to NO_2 in the atmosphere. Thus the total NO_2 concentration found by the OLM is the sum of the ozone concentration plus 10% of the NOx concentration. This gives the following result for the maximum hourly NO_2 concentration:

$[NO_2]_{max,\ one\text{-}hour} = 0.1\ [0.52\ ppm] + 0.12\ ppm = 0.17\ ppm$ (project emissions only)

This maximum concentration to the project must be added to the background NO_2 concentration of 0.04 ppm. This gives a maximum one-hour NO_2 concentration for the project plus background of 0.21 ppm in the no-mitigation case.

The annual average NOx concentration was computed to be 29.59 $\mu g/m^3$ (as NO_2). This is equivalent to a concentration of 0.016 ppm. The ARM takes the annual average NO_2 concentration to be 75% of this level or 0.012 ppm of NO_2 for the annual average amount due to the project. The annual average background NO_2 concentration of 0.003 ppm is added to the project amount to give a total annual average concentration for the project plus background of 0.015 ppm.

The with-mitigation case and comparison of results - The procedure for the with mitigation case is done in the same manner as the without-mitigation case. In the with-mitigation case, the maximum one hour NOx concentration was 408.3 $\mu g/m^3$. This is equivalent to a concentration of 0.22 ppm. As in the without-mitigation case, the ozone concentration is less than 90% of the maximum NOx concentration so the same method applies. This gives the maximum one-hour NO_2 concentration due to the project as

$$[NO_2]_{max,\ one\text{-}hour} = 0.1 * [0.22\ ppm] + 0.12\ ppm = 0.14\ ppm$$

Adding the one-hour background concentration of 0.04 ppm gives a total (project plus background) maximum one-hour NO_2 concentration of 0.18 ppm. The modeled annual-average NOx concentration is 18.24 $\mu g/m^3$. This is equivalent to a concentration of 0.0097 ppm. Taking 75% of this concentration and adding the annual average background of 0.003 ppm gives a total (project plus background) annual average NO_2 concentration of 0.010 ppm.

The with- and without-mitigation cases are compared in the following table.

Modeled Ambient NO_2 Concentrations
Project Impacts plus Background in ppm

Case	One-hour Maximum	Annual Average
Without Mitigation	0.21	0.015
With Mitigation	0.18	0.010